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OF AUSTRALIA



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VOL. II.—30TH YEAR.

SYDNEY, SATURDAY, SEPTEMBER 11, 1943.

No. 11.

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CONGENITAL DEFECTS IN INFANTS FOLLOWING INFECTIOUS DISEASES DURING PREGNANCY.

WITH SPECIAL REFERENCE TO THE RELATIONSHIP BETWEEN GERMAN MEASLES AND CATARACT, DEAF-MUTISM, HEART DISEASE AND MICROCEPHALY, AND TO THE PERIOD OF PREGNANCY IN WHICH THE OCCURRENCE OF RUBELLA IS FOLLOWED BY CONGENITAL ABNORMALITIES.

By CHARLES SWAN,¹ A. L. TOSTEVIN, THE LATE BRIAN MOORE, HELEN MAYO AND G. H. BARHAM BLACK,
From the Institute of Medical and Veterinary Science, Adelaide, South Australia.

At the annual meeting of the Ophthalmological Society of Australia (British Medical Association) in October, 1941, Gregg⁽¹⁾ recorded a series of 78 cases of congenital cataract occurring in babies between December, 1939, and January, 1941. With few exceptions their mothers had suffered during the early stages of pregnancy from an exanthematous disease diagnosed as rubella. Many of the babies were of small size, ill-nourished and often difficult to feed. In 44 of them a congenital lesion of the heart also was detected, in 10 the heart was apparently normal, and in the remainder the cardiac condition was not recorded. The cataracts were of dense nuclear type; in 62 cases they were bilateral and in the remainder unilateral. In 11 of the 16 monocular cases the affected eye was microphthalmic. According to Gregg, there was no similarity in the appearance of the cataracts to any of the morphological types of congenital and developmental opacity reported previously.

Because similar cases had occurred in South Australia, it seemed important to confirm and if possible to extend

Gregg's findings, and to determine (i) whether the disease during pregnancy was rubella or some illness which simulated it, (ii) what was the precise period of pregnancy in which the disease was effective in producing congenital abnormalities, (iii) what was the full range of these defects, and (iv) whether other infectious diseases occurring during pregnancy led to similar effects. Accordingly, steps to deal with the problem were taken by the South Australian members of the Ophthalmological Society of Australia, the South Australian Branch of the British Medical Association and the Institute of Medical and Veterinary Science.

At the outset it should be stressed that any success the investigation may have attained has been made possible only through the whole-hearted cooperation and enthusiasm of a considerable number of South Australian medical practitioners, too numerous to mention by name. Their kindness and courtesy in supplying us with information and in allowing us to examine their patients has placed us greatly in their debt.

PLAN OF THE INVESTIGATION.

Under the ægis of the National Health and Medical Research Council, one of us (C.S.) was appointed to take general charge of the inquiry, to collect and correlate the data, to act as liaison officer between other members of the team, and to assist another of us (H.M.) with the routine physical examinations. Two of us (A.L.T. and B.M.) undertook the ophthalmological and oto-rhinological portions of the investigation. (After the death of Dr. Moore, another of us, G.H.B.B., completed his share of the work.) In addition, the honorary radiologist to the Adelaide Children's Hospital radiologically examined the hearts and skulls of a number of the babies. A few of the children were also photographed.

On October 7, 1942, a circular letter embodying the main facts of Gregg's paper and inviting cooperation in the investigation was sent to all medical practitioners in the State. When children, whether suffering from congenital abnormalities or not, had been born of mothers who had

¹ Working with a grant from the National Health and Medical Research Council.

suffered from acute exanthemata during pregnancy, it was asked that the *questionnaire* reproduced here should be filled in. Whenever practicable, permission was requested to interview the mother with regard to her illness during pregnancy and to submit the baby to examination by the specialist members of the team. In the metropolitan area, when a pregnant woman developed rubella or morbilli, it was asked that one of us (C.S.) should be communicated with immediately a diagnosis was made, so that he could interview and examine the patient and follow the history of the child born subsequently. If the patient lived in the country, it was requested that data should be supplied after the birth of the baby as to whether or not the child was born healthy.

QUESTIONNAIRE.

Children Born of Mothers Who have Suffered from Exanthemata during Pregnancy.

Practitioner: _____
 Address: _____
 Mother's name: _____ Age: _____
 Address: _____
 Date of birth of child: _____ M. or F.: _____ Birth weight: _____
 Present weight: _____
 Nature of congenital defect, if any: _____
 Will mother permit examination by specialists? _____
 Has child been examined by specialists? _____
 Did mother suffer from exanthem during pregnancy? _____
 If so: Date of last menstrual period before pregnancy: _____
 Date of exanthem: _____
 Diagnosis of exanthem: _____
 Was the exanthem "typical" (type, distribution and itchiness of rash, enlargement of cervical lymph glands, etc.): if not, what were the unusual features? _____
 Was mother otherwise healthy during pregnancy? _____
 Constitutional disease: _____
 Acute infection: _____
 Has mother suffered from measles (true or German) before? _____
 Did other members of the household suffer from a similar condition? _____
 Has mother other children? _____
 Are they healthy? _____
 Has mother had previous miscarriages? _____
 Is there any family history of congenital defect? _____
 In your opinion have the recent outbreaks of measles or German measles as a whole: _____
 (a) shown any peculiar features? _____
 (b) had any unusual age-incidence? _____
 If so, please give particulars: _____

RESULTS OF THE INVESTIGATION.

In the discussion of the results, the mothers have been divided into four classes, namely: (a) those who suffered during pregnancy from rubella (49), (b) those who had no knowledge of any exanthem during this time (four), (c) those who contracted morbilli (nine) and (d) those who suffered from mumps (two). The cases occurred in the years 1939 to 1943.

Rubella during Pregnancy and Congenital Defects.

Geographical Distribution.

At the time when they suffered from rubella, all but four of the 49 mothers comprising the series lived in South Australia (Table I). Fifteen of them lived in country districts, the remaining 30 in the metropolitan area of Adelaide. They were widely scattered; there was no apparent tendency for them to be confined to particular areas. Of the patients out of South Australia, all lived in New South Wales, three at Sydney and one at Broken Hill.

Annual Incidence of Cases.

In eight of the 49 cases the exanthem occurred in 1939, in six in 1940, in seven in 1941 and in 28 in 1942. The number of infants born with congenital abnormalities following rubella in the mothers during these years (1939, 1940, 1941 and 1942) was eight, six, five and twelve respectively.

At first sight these figures suggest that in the period 1939 to 1941 a much greater proportion of cases of rubella during pregnancy was followed by congenital abnormalities than during 1942. It should be remembered, however, that with two exceptions, from earlier years opportunity was afforded only for the collection of "positive" cases; in 1942 both "positive" and "negative" cases were recorded.

Nature and Manifestations of the Exanthematous Disease.

Gregg expressed doubts as to whether the exanthem suffered during pregnancy by the mothers whose children later manifested congenital defects was true rubella. In view of this scepticism, a detailed analysis of the character of the symptoms and signs was undertaken, and the disease was compared with that suffered by the mothers whose babies were born healthy. All of the 49 mothers, with the exception of the patient in Case 43, were interviewed by one of us (C.S.). Unfortunately, in some instances so much time had elapsed between the period of the exanthem and that of the interview that many details had been forgotten. Moreover, some patients were more intelligent and observant than others.

Of the 49 patients, 35 were diagnosed by medical practitioners as suffering from rubella. Of the 14 who failed to seek medical attention at the time of the exanthem, four (Cases 3, 10, 15 and 21) contracted an illness similar to that of their husbands, which had been diagnosed as rubella by their respective medical attendants one to three weeks before. In Case 35 the diagnosis was made by a nurse. In Cases 6, 8, 9, 11, 16, 20, 24 and 25 the disease was diagnosed either by the patient or by her relatives or friends. The medical practitioner in Case 40 was called too late to be able to differentiate between rubella or morbilli. It is unfortunate that of the 14 patients who failed to seek medical advice, 13 (Cases 3, 6, 8, 9, 10, 11, 15, 16, 20, 21, 24, 25 and 35) were mothers whose babies subsequently developed congenital defects. (In the remainder of the paper, mothers whose children exhibited congenital abnormalities are referred to as "Group I" and those whose babies remained healthy form "Group II".)

Premonitory Symptoms.—Premonitory symptoms were noticed by eight of 31 mothers of Group I and by nine of 18 mothers belonging to Group II. In the former group, two patients (Cases 4 and 8) suffered from tiredness and depression; one (Case 3) complained of pains in her limbs and back and of a feeling as though she were developing a "cold"; one (Case 25) suffered from nausea, listlessness and a feeling as though she were catching a "cold"; two (Cases 17 and 23) contracted sore throat; the two last mentioned also suffered from general malaise; one (Case 18) suffered from general malaise and pains in the limbs for five days; one (Case 7) had attacks of sneezing associated with general malaise. In Group II, five mothers (Cases 36, 40, 44, 46 and 48) contracted "colds" at intervals of one to seven days before the appearance of the rash; one (Case 46) suffered also from tiredness and one (Case 48) from shivering attacks; two (Cases 38 and 29) complained of nausea and vomiting for one and five days respectively; one (Case 33) contracted diarrhoea and another (Case 47) a sore throat.

Character of Rash.—For the most part the appearance of the exanthem was similar in the two groups of cases. It consisted of a fine, "pin-point", slightly raised, pink (sometimes red), non-itchy rash, which, according to some of the patients, resembled "heat rash" or prickly heat. In five cases of Group I (Cases 5, 16, 17, 26 and 28) no definite information about the rash was obtainable; one patient (Case 8) described the rash as composed of "pinkish-red, flat spots perhaps about one-eighth of an inch in diameter", and another (Case 35) thought that the spots were fairly large. No definite description of the nature of the rash was elicited in eight of the cases of Group II (Cases 29, 33, 37, 40, 45, 46, 47 and 48); in Case 49 the mother considered that the rash was "blotchy" in character. Itchiness of the rash was complained of only in Cases 3, 16, 18, 19, 23, 35, 41, 39, 45, 48 and 49; of these only the first seven belonged to Group I.

Distribution of the Rash.—In general, in both groups of cases, the rash commenced on the face, neck or chest and

TABLE I.
Analysis of Type and Period of Onset of Infectious Disease during Pregnancy and of the Congenital Defects in the Infants Born Subsequently.

Case No.	Address of Mother at Time of Disease.	Age in Yrs.	Disease During Pregnancy.	Number of Months Pregnant at Onset of Disease.	Date of Last Menstrual Period Prior to Pregnancy.	Date of Birth of Baby.	Expected Date of Birth.	Sex of Child.	Birth Weight (lb. and ozs.).	Circumference of Skull (Inches) with Normal Measurement for Age and Sex in Parentheses.	Congenital Defects.	Remarks.
1	Sydney, N.S.W.	25	Rubella.	Not > 2	4.7.40	8.4.41	11.4.41	F.	4 8	16.5 (18-0)	Bilateral cataract, heart disease. Probable mental deficiency.	
2	Inman Valley, S.A.	34	Rubella.	1	29.8.41	14.6.42	5.6.42	M.	7 10	16.75 (18-0)	Bilateral cataract, heart disease. Probable mental deficiency.	Cesarean section.
3	Sydney, N.S.W.	22	Rubella.	1	11.12.41	10.10.42	18.9.42	M.	8 12	16.0 (14-9)	Hypospadias.	
4	Toorak, S.A.	33	Rubella.	1	10.11.39	21.6.40	17.8.40	F.	3 8	18.0 (18-8)	Left-sided cataract, heart disease.	
5	Broken Hill, N.S.W.	20	Rubella.	1	3.2.39	11.11.39	10.11.39	F.	5 0	18.0 (19-25)	Deaf-mutism, heart disease.	
6	Hindmarsh, S.A.	21	Rubella.	1	Middle of July, 1942.	4.5.43		M.	4 4		Bilateral cataract, heart disease.	
7	Streaky Bay, S.A.	20	Rubella.	1	5.6.42	23.1.43	12.3.43	M.	3 9	13.1 (14-4)	Bilateral cataract.	
8	Auburn, S.A.	30	Morbili.	2 1	13.9.41	10.5.42	20.6.43	F.	2 5	15.5 (16-9)	Bilateral cataract.	
9	Dulwich, S.A.	18	Rubella.	1-1 1	October, 1939	18.7.40		M.			Bilateral cataract.	Died of bronchopneumonia subsequent to morbilli at 2 1/2 months of age.
10	Prospect, S.A.	26	Rubella.	1 1/2	3.10.39	22.7.40	10.7.40	F.	5 8	18.25 (18-8)	Heart disease.	
11	Owen, S.A.	23	Rubella.	1 1/2	25.7.42	12.4.43	1.5.43	F.	3 12	11.0 (13-5)	Heart disease.	Died.
12	Maitland, S.A.	38	Rubella.	1 1/2	9.9.39	13.6.40	16.6.40	M.	6 12	19.5 (19-3)	Deaf-mutism.	
13	Foraka, S.A.	23	Rubella.	1 1/2	20.12.40	7.10.41	27.9.41	M.		17.3 (18-3)	Heart disease.	
14	Meadows, S.A.	31	Rubella.	1 1/2	3rd week of June, 1940	25.2.41		F.	6 0	18.1 (18-6)	Deaf-mutism.	
15	Tallem Bend, S.A.	27	Rubella.	1 1/2-2	End of July, 1940	30.4.41		M.	3 4	17.75 (18-9)	Left-sided cataract, talipes equinovarus, heart disease.	
16	Giles Plains, S.A.	32	Rubella.	Probably < 2	19.9.41	21.6.42	26.6.42	F.	6 12	15.75 (16-2)	Bilateral cataract, heart disease.	
17	Dulwich, S.A.	29	Rubella.	2		28.4.41		F.	4 0	16.5 (18-0)	Bilateral buphthalmos. Heart disease. Probable mental deficiency.	
18	Glenelg, S.A.	26	Rubella.	2	17.8.42	19.5.43	24.5.43	M.	6 6	13.5 (13-9)	Microcephaly.	
19	Medindie, S.A.	31	Rubella.	2	7.9.39	9.6.40	14.6.40	F.	7 3		Deaf-mutism.	
20	North Adelaide, S.A.	35	Rubella.	2	7.5.42	3.3.43	14.2.43	M.	6 7	14.5 (14-9)	Heart disease.	
21	Sydney, N.S.W.	31	Rubella.	2 2	30.7.40	5.4.41	6.5.41	F.	5 0	17.5 (18-2)	Deaf-mutism, heart disease.	
22	Walkerville, S.A.	32	Rubella.	2 2	4.12.41	28.8.42	11.9.42	F.	4 5	15.5 (16-9)	Microcephaly. Mentally retarded.	
23	Bolivar, S.A.	26	Rubella.	2 1/2	12.5.42	13.2.43	19.2.43	M.	5 0	13.75 (14-4)	Heart disease.	
24	Adelaide, S.A.	19	Rubella.	2 1/2	End of May, 1942	17.2.43		M.	5 1 1/2	13.75 (14-1)	Bilateral cataract, heart disease.	Died.
25	Hackney, S.A.	—	Rubella.	2 2	0.7.42	28.4.43	16.4.43	F.	5 0	12.5 (14-0)	Left-sided cataract, heart disease.	Died.
26	Quorn, S.A.	28	Rubella.	2 1/2	24.9.41	6.7.42	31.6.42	F.	5 7	16.25 (17-2)	Bilateral cataract.	
27	Helmsdale, S.A.	18	Rubella.	2 1/2	4.10.39	15.7.40	11.7.40	M.	6 4	19.4 (19-8)	Deaf-mutism.	
28	Alberton, S.A.	31	Rubella.	3		30.5.40		F.	5 5	18.0 (18-8)	Bilateral cataract.	
29	North Adelaide, S.A.	20	Rubella.	3	10.6.42	25.3.43	17.3.43	M.	8 5	15.75 (14-75)		
30	Tallem Bend, S.A.	30	Rubella.	3	1.4.43	21.1.43	8.1.43	M.	8 4	15.75 (14-85)	Heart disease.	
31	North Adelaide, S.A.	31	"Woodside throat". Rubella.	2	30.5.42	8.3.43	6.3.43	F.				
32	Everton, S.A.	30	Rubella.	3	10.6.42	24.3.43	17.3.43	F.	4 10			
33	Medindie, S.A.	33	Rubella.	3	28.8.41	12.6.42	4.6.42	M.	7 3			
34	Large Bay, S.A.	22	Mumps.	3 1/2	8.7.42	20.5.43	15.4.43	F.	8 3			
35	Clare, S.A.	27	Rubella.	3 3/4-5	10.5.40	1.2.41	17.2.41	F.	6 12	18.75 (18-6)	Deaf-mutism.	
36	Woodville, S.A.	27	Rubella.	4	4.6.42	10.3.43	11.3.43	F.	8 2	15.0 (14-5)		
37	Glenside, S.A.	30	Rubella.	4 1/2	14.4.41	14.1.42	21.1.42	F.	6 14			
38	Payneham, S.A.	22	Rubella.	4 1/2	28.4.42	31.1.43	5.2.43	M.	8 14			
39	Fulham, S.A.	18	Rubella.	5	6.3.42	12.12.42	13.12.42	F.	6 6	16.0 (15-5)		
40	Brompton, S.A.	22	Rubella.	5 1/2	17.5.42	27.2.43	24.2.43	F.	7 5	14.5 (14-0)		
41	Croydon, S.A.	22	Morbili.	5 1/2-6	11.2.42	17.11.42	18.11.42	M.	5 8	14.9 (16-5)	Microcephaly.	
42	Whyalla, S.A.	23	Rubella.	6	4.1.42	15.10.42	11.10.42	F.	7 10	14.5 (14-25)		
43	Sevenhills, S.A.	42	Rubella.	7 6	25.3.42	3.12.42	1.1.43	M.	6 10			
44	Fullarton, S.A.	19	Rubella.	6-7		2.1.43		F.				
45	Semaphore, S.A.	28	Rubella.	7	5.2.42	1.10.42	12.11.42	M.	4 14			
46	Woodville, S.A.	26	Rubella.	7	18.12.41	2.10.42	25.9.42	F.	5 15	17.4 (17-1)		
47	Hindmarsh, S.A.	24	Rubella.	8	24.1.42	25.10.42	31.10.42	M.	6 2			

TABLE I.—Continued.

Analysis of Type and Period of Onset of Infectious Disease during Pregnancy and of the Congenital Defects in the Infants Born Subsequently.—Continued.

Case No.	Address of Mother at Time of Disease.	Age in Yrs.	Disease During Pregnancy.	Number of Months Pregnant at Onset of Disease.	Date of Last Menstrual Period Prior to Pregnancy.	Date of Birth of Baby.	Expected Date of Birth.	Sex of Child.	Birth Weight (lb. and ozs.).	Circumference of Skull (Inches) with Normal Measurement for Age and Sex in Parentheses.	Congenital Defects.	Remarks.
43	Alberton, S.A.	24	Rubella.	8½	31.1.42	31.10.42	6.11.42	F.	5 12	17.5 (16.6)		
49	Malvern, S.A.	20	Rubella.	9	13.1.42	1.11.42	20.10.42	F.	4 8	16.4 (17.6)	Bilateral cataract, heart disease, probable mental deficiency.	Mother has no knowledge of any disease during pregnancy.
50	Darwin, N.T.	20	—	—	—	31.3.41	—	F.	—	—	Left-sided cataract.	Mother has no knowledge of any disease during pregnancy.
51	Glencig, S.A.	28	—	—	10.12.38	30.9.39	17.9.39	F.	—	—	Left-sided cataract.	Mother had disease characterized by severe laryngitis, "running" nose, aching of limbs and pyrexia. There was no cough. A rash was denied.
52	Malvern, S.A.	21	"Influenza."	3	6.6.42	14.3.43	13.3.43	F.	4 9½	13.75 (14.75)	Left-sided cataract, heart disease.	Mother has no knowledge of any disease during pregnancy. She worked in a cordite factory in the early stages of pregnancy.
53	Bolivar, S.A.	44	—	—	—	12.3.43	—	F.	—	14.75 (14.5)	Bilateral cataract. Mongolism.	Aborted spontaneously 10 days after appearance of exanthem.
54	Yankalilla, S.A.	35	Morbili.	2½	—	—	—	—	—	—	—	—
55	Hackam, S.A.	42	Morbili.	4½	22.6.42	14.4.43	29.3.43	F.	8 13½	—	—	—
56	Gawler, S.A.	30	Morbili.	5	21.5.42	9.3.43	28.2.43	M.	10 0	—	—	—
57	Ethelton, S.A.	30	Morbili.	7	17.5.42	25.2.43	24.2.43	F.	6 4	—	—	—
58	Ceduna, S.A.	28	Morbili.	7½	—	12.2.43	—	M.	6 8	—	—	—
59	Penong, S.A.	24	Morbili.	8½	1.10.41	17.6.42	8.7.42	F.	9 13	—	—	—
60	Koonibba, S.A.	21	Morbili.	?	7.1.42	17.11.42	14.10.42	F.	—	—	—	—
61	Hindmarsh, S.A.	16	Mumps.	3½-4	—	14.7.40	—	M.	—	—	Bilateral corneal opacities.	—

became generalized. Occasionally the exanthem was distributed over the entire body at the outset. In Case 10 the rash was thought to have been confined to the face, in Case 12 to the face and arms, in Case 13 to the arms and chest, in Case 16 to an area behind the ears, in Case 20 to the chest, in Case 25 to the face, arms and neck, in Case 28 to the face and neck and in Case 29 to the face and chest. The mother in Case 24 was unable to supply any information.

Duration of the Exanthem.—As far as could be determined, in neither group of cases was it usual for the rash to last longer than three or four days. In Cases 2, 18 and 21, however, the rash was said to have been present for seven days and in Case 35 for ten days.

Lymphadenitis.—Of Group I, swelling of the postauricular or cervical lymph glands, or of both, was present in 19 cases, absent in five cases (Cases 8, 14, 17, 25 and 41) and doubtful in seven cases (Cases 2, 3, 4, 6, 15, 24 and 35). In Group II positive findings were recorded in eleven cases, negative findings in five cases (Cases 31, 32, 40, 42 and 45) and doubtful findings in one case (Case 49).

Concomitant Signs and Symptoms.—Tiredness, sleepiness and lassitude occurred in Cases 2, 3, 9, 14, 15, 21 and 30; in Case 21 these symptoms were pronounced. It is noteworthy that all of these patients belonged to Group I. Soreness of the eyes and photophobia, occasionally associated with swelling of the eyelids, were noted in thirteen of the mothers of Group I (Cases 2, 3, 5, 8, 11, 15, 19, 22, 23, 24, 25, 27 and 30) and in four of Group II (Cases 32, 36, 42 and 44). Arthritis occurred in six cases; three (Cases 2, 11 and 15) belonged to Group I and the remainder (Cases 39, 46 and 49) to Group II. One patient

(Case 2) complained of swelling of her face, hands and feet, and of being "unable to bend to put the 'cups' of the milking machine on the teats of cows". One (Case 11) noted pain on movement in her knees, hands and wrists; the joints were stiff, but not swollen. One (Case 15) said that her knees were "puffy", swollen and painful for about two days. In Case 39 there was stiffness of the knees, in Case 46 swelling of the joints of the fingers and in Case 49 stiffness of the right hip and knee joints. Headache was present in Cases 1, 24, 26, 34 and 35. All but one of these patients (Case 34) belonged to Group I.

Of the five mothers who suffered from sore throat (Cases 16, 27, 41, 40 and 48), only the three first-mentioned were derived from Group I. Stiffness of the neck was noted in Cases 16 (Group I) and 29 (Group II). A cough occurred in association with the disease only in Cases 18 and 19 (Group I) and in Cases 40 and 44 (Group II). Three mothers (Cases 9, 13 and 26) complained of feeling "hot" during their illness; all belonged to Group I. Vomiting occurred only in Group I (Cases 17, 21 and 27). Nausea was present in Cases 27 and 35 and anorexia in Cases 21, 27 and 34. Only the last-mentioned case was of Group II. Uncommon symptoms were generalized aching (Case 28), giddiness (Case 34) and sweating (Case 46). Only the first case belonged to Group I. We gained the impression that the disease was occasionally more severe, in the mothers of Group I than in those of Group II.

Source of Infection.

In Cases 2, 3, 10, 15, 19, 21 and 35 the husband, in Cases 8, 25 and 28 the children, in Cases 6 and 49 brothers, in Case 31 a nursemaid, and in Cases 18 and 29 friends, were

considered to be the probable sources of infection. The husband of the patient in Case 20 had visited a friend suffering from rubella, but had failed to contract the disease himself.

Previous Infectious Diseases.

If three indefinite cases are excluded (Cases 4, 18 and 30), all of the remainder of the patients with the exception of 15 (Cases 3, 7, 9, 12, 16, 17, 23, 24, 27, 38, 39, 42, 43, 44 and 47) had suffered from morbilli. Ten patients (Cases 1, 10, 22, 25, 34, 35, 37, 46, 47 and 48) had had mumps, seven (Cases 2, 10, 11, 12, 31, 33 and 41) had had diphtheria, ten (Cases 7, 10, 19, 22, 31, 33, 34, 36, 37 and 40) had had chickenpox, eight (Cases 6, 11, 19, 22, 31, 33, 36 and 40) had had whooping cough and one (Case 36) had had scarlet fever.

Relation of the Period of Pregnancy at which the Exanthem Occurred to the Development of Congenital Abnormalities in the Child.

Arranged in order of development of the exanthem during pregnancy (Table I), the cases showed in a very striking fashion that, with two exceptions (Cases 35 and 41), the 31 mothers who subsequently gave birth to children with congenital defects had all contracted rubella within the first three months of pregnancy.

More detailed examination (Table II) disclosed that all the 25 patients contracting rubella in the first two months of pregnancy (eight in the first month and seventeen in the second) later had infants with congenital abnormalities. Only four of the eight who contracted the disease in the third month of pregnancy, however, gave birth to congenitally defective children.

TABLE II.

Relationship between the Time of Contraction of Rubella during Pregnancy to the Occurrence of Congenital Defects in the Infants Born Subsequently.

Month of Pregnancy.	Number of Infants with Congenital Defects.	Number of Healthy Children.	Total.
0 to 1	8 (4)	—	8 (4)
1 to 2	17 (2)	—	17 (2)
2 to 3	4 (1)	4	8 (5)
3 to 4	1 (2)	3	4 (5)
4 to 5	—	3	3 (3)
5 to 6	—	3	3 (3)
6 to 7	—	3	3 (3)
7 to 8	—	1	1 (1)
8 to 9	—	2	2 (2)
Total	31 (18)	18 (7)	49 (25)

¹ Refers to Case 35.

² Refers to Case 41.

The Nature of the Congenital Defects.

As previously noted by Gregg, many of the babies "were of small size, ill-nourished and difficult to feed".

The average birth weight of 29 of the babies with congenital defects was five pounds seven ounces, and that of 13 babies without apparent abnormality was six pounds ten ounces. Of the former group, seven babies (Cases 4, 7, 8, 11, 21, 22 and 35), and of the latter three babies (Cases 19, 43 and 45) were premature. Even when born at or near full time, the congenitally defective babies were sometimes subnormal in weight—for example, those in Cases 1, 5 and 6.

Eye Defects.—The series of children with eye defects comprised 14, of whom 13 (six males and seven females) had cataract and one (a female) had buphthalmos (Table III). With two exceptions (Cases 26 and 28) none of the mothers had been more than two months' pregnant at the time of onset of the exanthem. In ten cases the cataract was bilateral and in three it was unilateral. In all three unilateral cases the left eye was involved. Most of the cataracts were of the central nuclear type. In Case 7 the right lens was more affected than the left. Nystagmus was recorded as present in Case 1, "not pronounced" in

Case 2, and absent in Cases 7, 8, 24 and 25. In Case 2 moderate microphthalmos was present. In Case 26 the lenses were very small.

In Case 25 we were able to measure the eyes obtained at autopsy. The measurements of the right eye (normal) after twenty-four hours' fixation in 10% formol-saline solution were as follows: transverse diameter (average) 1.53 centimetres, antero-posterior diameter (average) 1.55 centimetres and volume 2.0 cubic centimetres. Similar measurements of the left eye were respectively 1.4 centimetres, 1.4 centimetres and 1.5 cubic centimetres. (The volume was measured by dropping the eye into ether in a graduated vessel.) The degree of microphthalmos was best brought out by this measurement. The affected eye was only three-quarters the size of the other.

In one of the other two unilateral cases (Case 4) the affected eye was microphthalmic. Examination of the other eye disclosed multiple small pigmented spots on the fundus.

Dissection was carried out in Cases 1, 2, 8, 16, 26 and 28. In Cases 9, 24 and 25 the baby died before any treatment was undertaken. No operation was performed in Cases 4 and 15, in which the cataract was unilateral.

The appearance of the cataracts conformed exactly to the excellent description given by Gregg. It was only under general anaesthesia and mydriasis that a careful examination could be made—that is, usually at the time of operation. The opacity then had the appearance of a flattened dense white disk in which six radiating lines were visible. These lines were presumed to be the two lens Y's superimposed, giving an appearance like a minute white starfish. If good mydriasis was obtained, a clear zone was visible peripheral to the opacity. The whole lens was very small, however, and at operation tended to move with the needle, so that the edge of the lens and suspensory ligament appeared within the pupillary margin.

Operation consisted of dissection, and, as stated by Gregg, was likely to be very difficult, owing partly to the small cornea and shallow anterior chamber, but more especially to the dense nature of the cataract. Whereas ordinarily the operator has only to incise the lens capsule and thus allow the aqueous to have access to the lens protein, in these cases the capsule and cataract seemed to be adherent, and little result was obtained unless the cataract could be effectively broken up by the needle. In some cases, as mentioned by Gregg, the whole opaque disk lifted out into the anterior chamber; in these cases absorption was relatively rapid and complete, and one needling sufficed. In other cases several operations were necessary. We gained the impression that at operation one should attempt to lift out the cataractous part of the lens rather than proceed on orthodox lines.

Gregg has stressed the desirability of early operation if nystagmus is to be avoided. His arguments apply particularly to the bilateral cases; parents should be advised that operation should be undertaken at the earliest moment and that a general anaesthetic will not be too great a risk to a sickly baby. In the case of monocular cataracts little would be gained by early operation, since the cataractous eye is practically certain to be amblyopic whenever the operation is undertaken. Consequently operation for monocular cataract may, without harm, be deferred until the baby is a year or more old. Even if early operation on the bilateral cataracts is undertaken, there is a distinct probability that one eye will be amblyopic with strabismus.

Too few patients have so far been treated by us to yield much information as to when glasses should be or could be prescribed. We feel, however, that if circumstances permit, babies aged even under one year should be provided with correcting lenses in order to allow visual acuity to be developed to the best possible degree.

One patient (Case 17), who suffered from buphthalmos, showed considerable improvement after trephining.

In addition to the foregoing abnormalities, nine of the babies (Cases 1, 2, 4, 6, 15, 16, 17, 24 and 25) had a cardiac lesion. Three (Cases 1, 2 and 17) were probably also mentally deficient, while one (Case 15) had *talipes equinovarus*.

TABLE III.
Analysis of Congenital Eye Defects following Rubella during Pregnancy.

Case Number.	Nature of Eye Defects.	Treatment.	Result.	Associated Defects.	Remarks.
1	Bilateral cataract. Nystagmus. Right pupil very small and occluded with capsule. Left eye quite a good hole in capsule and good reflex. Pupils dilated very little with atropine.	Dissection carried out in New South Wales.	—	Heart disease. Probable mental deficiency.	
2	Bilateral sclerosed nuclear cataract in which the suture lines of the lens were clearly visible. Moderate microphthalmos. Nystagmus not pronounced.	Dissection at 3, 7 and 12 months.	Pupils clear. Examination of fundus not yet attempted nor glasses prescribed. Nystagmus now marked.	Heart disease. Probable mental deficiency.	
4	Left-sided cataract. Lens completely opaque. Eye microphthalmic and convergent. Right eye normal except for multiple pigmented spots on fundus.	Nil.		Heart disease.	
6	Bilateral cataract.			Heart disease.	
7	Bilateral cataract. Right lens opaque. Left nuclear opacity. No nystagmus at time of examination.				
8	Bilateral nuclear cataract with some clear cortex and no nystagmus.	Dissection at 4½ months. Cataractous portions of lenses were lifted out and no further operative treatment was necessary. Glasses not yet prescribed.			
9	Bilateral cataract.	Nil.			Baby died at the age of 2½ months from bronchopneumonia subsequent to morbilli.
15	Left-sided cataract.	Nil.		Heart disease. <i>Talipes equinovarus.</i>	
16	Bilateral cataract.	Dissection at 19 weeks, and 6, 7½, 9½ and 11½ months.	There are now good openings in the pupillary areas and no further dissection should be required. This child has nystagmus and a slight convergent squint. She also has developed the habit of holding her left index finger up in front of her face and passing it to and fro before her eyes. She also puts her hand out to grasp objects that are held in front of her. We intend putting her into a correction at once.	Heart disease.	
17	Bilateral buphthalmos with oedematous opaque cornea. Pupils inactive to light, 4.0 millimetres in diameter. Tension moderately increased.	Eyes trephined at age of 3 months.	Since trephining, disappearance of oedema. Opacity diminishing.	Heart disease. Probable mental deficiency.	
24	Bilateral cataract. No nystagmus.	Nil.		Heart disease.	Baby died at age of 2½ months from cardiac lesion and pulmonary atelectasis.
25	Left-sided cataract. Eye microphthalmic. Nystagmus not noted.	Nil.		Heart disease.	Baby died from cardiac lesion at age of 1 month.
26	Bilateral central nuclear cataract. Lenses very small.	Dissection at 8, 14 and 22 weeks and at 6 and 7½ months.	The pupillary area is not yet sufficiently clear of capsular and lenticular remains and will have to be treated again. She now has nystagmus and a slight convergent strabismus.		
28	Bilateral central cataract.	Dissection at 7, 15 and 23 weeks. The left pupil was clear after this and the child developed nystagmus and the right eye converged. Another dissection was done at one year and two weeks later a correction of +8.0 right and left was ordered.	This child is now 3 years of age and wears her correction constantly, but has gross nystagmus; it is surprising to see how much she is able to do with her vision. Close inspection of the fundi and a refractive estimation have not been attempted because the examination would have to be made under anaesthesia.		

Deaf-Mutism.—Seven patients (Cases 5, 12, 14, 19, 21, 27 and 35) were deaf mutes (Table IV); five were females and the remainder males. In addition to deaf-mutism, two of the children (Cases 5 and 21) suffered also from heart disease. That rubella in the mother during pregnancy may sometimes be followed by deaf-mutism was first observed by one of us (A.L.T.). In general the patients

were not totally deaf. Ability to hear high-pitched sounds such as train whistles still persisted. When speech was present it was limited to a few words, such as "Mum" or "Dad". In no case was there any evidence of hereditary deaf-mutism. In Case 5 there was a family history of adult deafness. The age of the patients prevented us from assessing bone and air conduction, but we gained the

TABLE IV.
Analysis of Congenital Deaf-mutism following Rubella in Pregnancy.

Case Number.	Nature of Deaf-mutism.	Treatment.	Result.	Associated Defects.
5	Can hear shrill train-whistle and screaming. Does not hear people walking up to her. Can say "More, Mum", perhaps owing to lip reading.	Nil.	—	Heart disease.
12	Deafness noted first at 14 years. Child very quiet. From birth not awakened by noise. Apparently not totally deaf—can hear radio and alarm clock when loud. Does not speak. Jabbers and yells.	Nil.	—	—
14	Mother believes child is not "stone-deaf". Child does not hear anyone calling her or walking up to her. Can hear high tones. Does not speak.	Nil.	—	—
19	Is extremely deaf—completely so after a cold. Apart from a few words such as "Get out", "Mum", and "Dad", she does not speak.	Bone conducting battery aid and lip-reading.	Satisfactory.	—
21	Does not respond to calling. Does not speak.	Nil.	—	Heart disease.
27	Deafness first noted when 2 years old. Mother believes hearing was satisfactory before that. Now can hear only high-pitched sounds and loud noises	Nil.	—	—
35	Child does not hear mother coming up behind her. Does not speak.	Nil.	—	—

impression that bone conduction was better than air conduction for high tones; low tones did not seem to be appreciated. On examination, the external canal and tympanic membrane showed no sign of abnormality. There may be more deaf mutes among the babies with other abnormalities than we have been able to determine at present.

The treatment of these children confronts us with a serious problem. We have treated one child (Case 19) with a bone conducting battery aid, commencing at two and a half years of age. This is a little early to get the necessary cooperation; but the child quickly increased her vocabulary, and this, together with teaching her lip reading, has yielded a very encouraging result. The authorities at the Deaf and Dumb Institution in this State have been approached, and they are considering our suggestion of starting a special class for the teaching of these patients in the manner adopted in Case 19. As we go along, we hope to evolve a satisfactory method of educating these children.

The average duration of pregnancy of the mothers of these children at the time of onset of the exanthem was 2.1 months. In comparison, the average duration of pregnancy of the mothers whose children suffered from cataract was 1.5 months. Thus we have gained the impression that the type of congenital defect is dependent upon the stage of pregnancy at which the mother develops German measles.

Cardiac Abnormalities.—The series of children with cardiac abnormalities consisted of 17 cases (eight males and nine females) (Table V). Six of them (Cases 10, 11, 13, 20, 23 and 30) suffered from heart disease without other apparent defect. (The first to observe cases of this nature was Dr. H. Arthur Goode, of Prospect, South Australia.) In addition to the cardiac lesions, five babies (Cases 1, 2, 6, 16 and 24) had bilateral cataract and three (Cases 4, 15 and 25) unilateral cataract. One child (Case 17) suffered also from bilateral buphthalmos and two children (Cases 5 and 21) from deaf-mutism.

A cardiac thrill was present in five cases (Cases 2, 4, 17, 20 and 21). Bruits were detected in 13 of the 16 babies examined (Cases 1, 2, 4, 5, 6, 10, 13, 15, 17, 20, 21, 23 and 25); of these murmurs, eight were systolic and five systolic-diastolic. In character they were usually loud and rough. In Cases 1, 2, 4, 10, 13 and 23 the murmurs were maximal in the pulmonary area. Clinical evidence of cardiac enlargement was detected in Cases 17, 20 and 21. It is noteworthy that cyanosis was absent in all 17 cases.

Clinically, in Cases 16, 24 and 30 the cardio-vascular system appeared normal; in each case, however, there was radiological evidence of cardiac abnormality and in Case 24 there was post-mortem evidence. Discrepancies were evident also in Cases 2, 10, 15 and 20, in which X-ray examination failed to support the positive clinical findings. In Cases 1, 4, 13, 17, 21 and 23 the radiological findings and clinical evidence were in harmony with each other.

The diagnosis in Case 11 was made at the post-mortem examination. As in Cases 24 and 25, in which autopsy was also performed, wide patency of the *ductus arteriosus* and a minor defect of the *foramen ovale* were present. In addition, however, in Case 11 a small defect of the membranous portion of the interventricular septum was present.

Microcephaly.—The only defect noted in Cases 18, 22 and 41 was microcephaly. With the exception of Cases 3, 6, 12, 30 and 35, this abnormality occurred in some degree in all of the cases in which other defects were present. It was most apparent in Cases 1, 2, 5, 7, 8, 13, 15, 17, 22, 25 and 41. Owing to the fact that some of the infants were premature, in a few instances the microcephaly may have been apparent rather than real. Further measurement when the children are older will be necessary to answer this question.

In some instances closure of the anterior fontanelle was delayed. Occasionally the fontanelle appeared larger than normal.

Other Abnormalities.—The child in Case 3 suffered from mild hypospadias (penile variety) without other apparent defect. As he was the only baby in the series with this defect, its occurrence subsequent to rubella in the mother during pregnancy may have been purely fortuitous.

Talipes equino-varus was present in Case 15.

In addition to microcephaly, one child (Case 1) showed flattening of the back of the head and aquiline of the nose. This combination of defects was present also in Case 17.

Probable mental deficiency was present in Cases 1, 2 and 17, and certain mental retardation in Case 22. Gregg⁽²⁾ stated that all of his patients were mentally retarded.

In the course of examination of the radiographs of the chests of the present series of congenitally defective infants, Gurner⁽³⁾ gained the impression that persistent thymus was more common than in normal babies.

Congenital Defects in the Absence of History of Rubella during Pregnancy.

Four cases of congenital cataract occurred, in which the mother denied all knowledge of any exanthem during pregnancy.

One child (Case 50) had bilateral cataract, a systolic apical murmur and microcephaly. The head was flattened posteriorly and the nose was aquiline. At the age of 19.5 months she was still unable to sit up. On radiological examination, the heart was found to be much more globular than normal, the appearance suggesting a congenital lesion with right-sided enlargement. The skull was smaller than normal with a prominent vertex and increased convolutional markings in the posterior parietal and occipital regions.

The only defect in Case 51 was left-sided cataract.

In Case 52 left-sided cataract, microcephaly and heart disease were present. The left eye was smaller than the right; the pupil dilated fairly well and examination disclosed a concentric red reflex above the lenticular opacity.

TABLE V.
Analysis of Cardiac Defects in Babies following Rubella in Pregnancy.

Case Number.	Symptoms and Signs of Heart Disease.	Report on X-ray Examination.	Associated Defects.
1	Soft systolic bruit in pulmonary area. "Clicking" first sound, second sound normal.	"The heart shadow is enlarged with rounded left border suggesting right-sided enlargement probably due to a congenital lesion."	Bilateral cataract. Probable mental deficiency.
2	Loud systolic murmur maximal at pulmonary area. Thrill present.	"Heart—no cardiac enlargement or abnormality of outline detected."	Bilateral cataract. Probable mental deficiency.
4	Systolic thrill. Loud "machinery" murmur all over precordium. Bruits most evident at left base, where they were somewhat more diastolic in type.	"The heart shadow is enlarged and there is a little congestion of the lung fields suggesting a congenital heart lesion."	Left-sided cataract.
5	Systolic murmur.	—	Deaf-mutism.
6	Loud, rough systolic murmur all over precordium.	—	Bilateral cataract.
10	Systolic murmur over pulmonary area in certain phases of respiration.	"The heart is not obviously enlarged and shows no definite abnormality."	—
11	Owing to prematurity no clinical examination was carried out. At autopsy, wide patency of the ductus arteriosus, a small defect of the membranous portion of the interventricular septum and slight patency of the foramen ovale were found.	—	—
13	Loud, rough murmur in pulmonary area during systole and diastole.	"The heart shadow is enlarged and the appearance suggests a congenital lesion."	—
15	Coarse systolic bruit.	"There is a shadow extending from the heart to the root of the neck suggesting an enlarged thymus. Otherwise the heart outline appears normal."	Left-sided cataract, talipes equino-varus.
16	No clinical evidence of heart disease.	"The heart shadow is more globular than normal suggesting a congenital abnormality."	Bilateral cataract.
17	Thrill present. Loud systolic and diastolic "machinery" murmur present all over precordium. Clinical evidence of heart enlargement.	"The heart shadow is somewhat more rounded than normal and possibly slightly enlarged suggesting the possibility of a congenital lesion."	Bilateral buphthalmos. Probable mental deficiency.
20	Heaving impulse all over precordium with thrill. Marked systolic bruit all over precordium maximal at left fourth intercostal space. Apex beat outside nipple line.	"Although the heart outline appears large as is usual in very young infants, no alteration in shape to suggest congenital abnormality is revealed."	—
21	Thrill present. Apex beat one inch outside nipple line and lying at anterior axillary line in 5th and 6th intercostal spaces. Roaring systolic-diastolic murmur with no differentiation of second sound.	"The heart shadow is enlarged probably as the result of a congenital lesion."	Deaf-mutism.
23	Systolic murmur maximal over pulmonary area.	"The heart shadow appears to be somewhat enlarged, but it is of doubtful significance at this age."	—
24	No clinical evidence of cardiac abnormality. At autopsy, wide patency of ductus arteriosus. The foramen ovale was patent and slit-like.	"The heart shadow is definitely enlarged and globular suggesting a congenital abnormality."	Bilateral cataract.
25	Systolic-diastolic murmur. At autopsy wide patency of the ductus arteriosus and slight patency of foramen ovale.	—	Left-sided cataract.
30	No clinical evidence of cardiac defect.	"The heart configuration is abnormal suggesting a congenital lesion."	—

In the right eye examination revealed pathological pallor of the optic disk and widespread "speckly" pigmentation of the fundus; some nystagmus was present. The cardiac lesion was characterised by a harsh systolic murmur to be heard all over the precordium. On X-ray examination the cardiac outline was found to be enlarged and globular, the appearance suggesting a congenital defect. When she was three months pregnant the mother had suffered from a pyrexial disease associated with severe laryngitis, a "running" nose and aching of the limbs. There was no cough. The presence of a rash was denied emphatically.

The infant in Case 53 had mongoloid deficiency in addition to bilateral cataract. The mother had worked in a cordite factory for the first six months of her pregnancy. The cataracts did not resemble those which occur subsequent to rubella.

Cases 50 and 52 bore considerable resemblance to some of the cases in which rubella had occurred. In view of the fact that the mother in Case 52 suffered from a febrile illness, is it not possible that this was a case of rubella without an exanthem, analogous to "morbilli sine morbillis"? During the early months of pregnancy the mother in Case 50 lived at Darwin, Northern Territory; in tropical climates heat rashes are extremely common, and the exanthem of rubella may have been attributed to this cause.

No suggestion can be made as to the aetiological factor concerned in Cases 51 and 53.

Absence of Congenital Defects following Morbilli in Pregnancy.

In seven cases only (Cases 54 to 60 inclusive), no congenital defects followed morbilli in pregnancy. With these should perhaps be included Cases 7 and 40. None of the mothers, with the exception of one (Case 7) who had suffered previously from rubella, gave birth to children with congenital defects. It is to be noted, however, that with the exception of one (Case 54), all the mothers were in at least the fifth month of pregnancy at the time of the exanthem. In the present series there is no evidence, therefore, one way or the other as to whether morbilli during the early months leads to congenital abnormalities or not. In Case 54 the occurrence of morbilli when the patient was two and a half months' pregnant was followed by spontaneous abortion ten days later.

Congenital Abnormalities following Mumps during Pregnancy.

Two mothers (Cases 61 and 33) suffered from mumps during pregnancy. The second mother also contracted rubella. In Case 61 the child was born with bluish-white bilateral corneal opacities without ciliary injection. The opacities were of a peculiar type dissimilar from any that one of us (B.M.) had seen previously. The child's blood serum failed to react to the Wassermann test. At the age

of twenty months the left cornea was practically clear and a good view of the fundus was obtainable. The opacity of the right cornea had diminished, but still covered the pupil. In the absence of similar cases, however, the association between mumps during pregnancy and corneal opacity must remain doubtful.

DISCUSSION.

Rubella is so common a disease that if cataract in the infant followed at all frequently after a maternal attack during pregnancy, the fact would be recorded in the textbooks. Yet it is only within the last two years that any considerable number of cases has been noticed. The type of cataract which occurs is apparently a new entity, and, according to Gregg, falls "exactly to correspond to any of the large number of morphological types of congenital and developmental lenticular opacities that have been described". For these reasons Gregg discussed whether or not the disease occurring during pregnancy was true rubella. Accordingly, in the present investigation we paid special attention to the character of the disease which developed during pregnancy.

The diagnosis and differential diagnosis of German measles is discussed in detail by Attlee.⁽⁴⁾ Among the diseases which may be confused with rubella are *exanthema subitum*, *erythema infectiosum*, morbilli, scarlet fever and glandular fever. With few exceptions, in our series of cases detailed analysis of the symptomatology failed to support any diagnosis other than that of rubella. It may be mentioned that 35 of the 49 mothers were diagnosed as suffering from rubella by medical practitioners of wide experience.

Gregg noted that the epidemic of German measles in 1940, which gave rise to most of his cases, was of greater severity and more often accompanied by complications than previous epidemics of his experience. In some of the cases of the present series the general constitutional symptoms and the occurrence of complications were more pronounced than usual. We gained the impression that the disease was sometimes more intense in mothers who later gave birth to congenitally defective infants than in those whose children were born healthy; but in a relatively small number of cases this impression has no great significance.

Concomitantly with the 1940 epidemic of rubella, an acute respiratory infection of rather unusual character was rife in the military camps of Australia. Seymour⁽⁵⁾ described the symptomatology of the disease, which passed under the names of "Ingleburn throat", "Puckapunyal throat" and "Woodside throat"; it was characterized by severe sore throat, a dry, hacking cough, severe tracheitis, dry in type, and a high temperature. Gregg suggested that the condition might have been streptococcal in origin, and that some of the cases in which a diagnosis of rubella was made might have been cases of toxic erythema accompanying the streptococcal infection. Against this are the observations of Cooke, Atkinson, Mawson and Hurst,⁽⁶⁾ that the predominant organism was *Hemophilus influenzae*, and that no similar signs and symptoms were of common occurrence in the patients of the present series. Indeed, "Woodside throat" is no longer epidemic; yet cases of congenital abnormality following rubella during pregnancy continue to occur. It is of interest that the only patient (Case 31) whose condition was diagnosed as "Woodside throat" gave birth to a normal infant, despite the fact that the disease occurred early in pregnancy.

In short, we have obtained no evidence of any condition other than rubella as an antecedent of the congenital defects we describe. We have no suggestions to offer for these new manifestations of (presumed) rubella, unless the virus has altered in virulence or has undergone some more subtle change within the last few years. It is conceivable that only under exceptional conditions such as occur in wartime, when large numbers of susceptible recruits are herded together in military camps and the disease spreads rapidly from one soldier to another, the causative agent reaches such a stage of virulence.

In his series Gregg stated that the majority of mothers had suffered from rubella in either the first or the second

month of pregnancy. Our results are confirmatory, in that, with two exceptions, in all of the 31 "positive" cases rubella had been contracted within the first three months of pregnancy. On the available evidence, when a woman contracts rubella within the first two months of pregnancy, it would appear that the chances of her giving birth to a congenitally defective child are in the region of 100%, and if she contracts rubella in the third month they are about 50%. To judge by Cases 35 and 41, there is still slight likelihood that the child will be congenitally defective if rubella is contracted after the third month of pregnancy.

Extensive investigations on the experimental inoculation of developing chick embryos with viruses, bacteria, fungi and protozoa have shown the great susceptibility of developing avian cells to a number of these infectious agents (Burnet,⁽⁷⁾ Goodpasture⁽⁸⁾). Goodpasture makes the following statement:

Indicative of a greater susceptibility of chick embryos as compared with the adult hen or with a mammalian host is the wide dissemination of focal areas of infection within the body of the embryo inoculated in the chorio-allantoic membrane with, for example, the viruses of vaccinia or herpes simplex, neither of which causes more than a mild lesion in chickens, and ordinarily no conspicuous if any disseminated lesions in mammals.

The inference that in mammals embryonic cells are likewise more susceptible than are adult tissues to infectious agents may be drawn from the work of Dimock and Edwards⁽⁹⁾ on virus abortion of mares. This has been demonstrated also by the investigations of Woolpert,⁽¹⁰⁾ of Stritar and Hudson,⁽¹¹⁾ of Markham and Hudson,⁽¹²⁾ of Gallagher and Woolpert,⁽¹³⁾ and of Dettwiler, Hudson and Woolpert.⁽¹⁴⁾ There are a considerable number of cases in the literature of prenatal infection of man, not only with viruses such as those of smallpox, measles and chickenpox, but also with spirochaetes and bacteria, such as those of syphilis and typhoid fever (Feldman,⁽¹⁵⁾ Goodpasture). Up to the present time the causative agent of rubella has not been isolated; it is believed to be a filterable virus. Is it not logical to assume, however, that the human embryo possesses the same susceptibility to infectious agents as avian and other mammalian embryos, and that the aetiological factor of German measles, after penetrating the chorionic barrier, is capable of producing severe lesions in the embryo, while the same infection in the adult tissues of the mother leads only to a minor illness?

The virtual confinement of congenital defects to infants whose mothers suffered from rubella during the first three months of pregnancy suggests that it is only during this period that the embryonic cells are highly susceptible to the aetiological agent of rubella. Another possibility which may be considered is that, after the formation of the placenta at the end of the third month of pregnancy, the barriers between mother and fetus become less penetrable to the causative factor of rubella. As far as this explanation is concerned, it may be mentioned that there is evidence that even late in pregnancy other viruses (for example, those of smallpox and morbilli) are still capable of penetrating the placental barrier.

The actual mechanism of production of the congenital defects described has yet to be determined. Hurst⁽⁶⁾ has pointed out that it is possible to correlate the congenital cardiac defects with the lesions of the lens, if it is assumed that the causative factor acts primarily on vascular tissue, and that the cataract follows interference with the nutrition of the lens fibres brought about by the action of the aetiological agent on the hyaloid artery (see Mann⁽¹⁶⁾).

The results of the present investigation confirm Gregg's work with regard to the occurrence of congenital cataract and heart disease. In a later communication, Gregg⁽¹⁷⁾ stated that all the patients of his series, even if not mentally defective, were retarded in their mental growth. For this and other reasons Gregg thought few, if any, of the children with both eyes affected were likely ever to develop into completely normal children. One or two of the children with one eye affected are showing slightly better mental development.

New observations resulting from our investigation include the occurrence of deaf-mutism, sometimes with heart disease, of heart disease without other apparent defect, of microcephaly and of hypospadias, in the infants of mothers who suffered from German measles during the earlier months of pregnancy. As these children develop it is possible that other defects will become evident.

Although rubella in pregnancy can sometimes lead to congenital heart disease, the converse—that is, that congenital heart disease always results from rubella—does not hold. In fifteen instances, when mothers whose children were listed at the Adelaide Children's Hospital as suffering from congenital heart disease were asked if they had suffered from mumps, diphtheria, chickenpox, scarlet fever, measles, German measles or whooping cough during the pregnancy which led to the birth of the child, the replies to the questionnaire were negative.

It is evident that the next step in dealing with this problem should be to isolate the causative agent of rubella with the object of preparing a protective vaccine against the disease. In the meantime the effect of repeated doses of convalescent serum should be studied, not only on mothers in the incubation period of the disease, but also as a prophylactic measure for any pregnant women who has not previously suffered from rubella. It is possible in the latter instance that it would at least serve to protect the patient during the first three months of pregnancy, when congenital defects are most likely to occur.

No opinion can be expressed on the effect of morbilli during pregnancy on the development or otherwise of congenital defects, since not only is the series of cases too small, but in the majority of them the disease occurred in the later months of pregnancy, when such effects are unlikely. In the case in which the disease occurred early in pregnancy spontaneous abortion followed ten days after the appearance of the exanthem.

It is possible that mumps early in pregnancy may result in corneal opacity in the child; but until similar cases are described the question must remain an open one.

In view of the fact that, in a high proportion of cases, the contraction of rubella in the early months of pregnancy will lead to congenital defects in the infants born subsequently, it has been suggested that in such cases the pregnancy should be terminated. It is clear, however, that there are no legal grounds for such an act (Smith,¹⁰ and Rex versus Bourne¹¹). The only reasons to justify induction of labour are (i) to save the life of the mother and (ii) to save the life of the child. Apart from these reasons, it should be pointed out that in a number of cases of the series the congenital defects were not gross. Moreover, if the law was amended to allow abortion in such cases, it would be open to considerable abuse.

SUMMARY.

Of 61 infants examined in the course of the present investigation, 36 were found to have congenital defects.

The mothers of 49 infants had suffered during pregnancy from rubella, four had no knowledge of any exanthem during this time, nine contracted morbilli during pregnancy, and two suffered from mumps.

In the cases of rubella during pregnancy, 31 of the infants born subsequently exhibited congenital defects. The abnormalities included cataract, deaf-mutism, heart disease, microcephaly and mental retardation. With two exceptions, all of the 31 mothers with congenitally defective children had contracted rubella within the first three months of pregnancy.

Four cases of congenital cataract are described, in some instances associated with other defects; the mothers denied all knowledge of an exanthem during pregnancy.

No congenitally defective babies were born subsequent to the occurrence of morbilli in pregnancy.

A case is recorded of congenital corneal opacity following mumps in pregnancy.

The pathogenesis of the defects is discussed.

ACKNOWLEDGEMENTS.

We are indebted to Professor E. Weston Hurst for helpful criticism and advice and to Professor J. B. Cleland for performing the post-mortem examinations, for allowing us to use his autopsy notes and for the gift of pathological material. Our thanks are due also to the Board of the Adelaide Children's Hospital for permitting the X-ray examinations to be carried out free of charge, and to Dr. Colin Gurner and Dr. Creagh Smeaton and Mr. B. G. Compton for performing this work. It is impossible to record by name all of the many medical practitioners who helped us; we would mention especially, however, Dr. D. G. McKay, Dr. H. Arthur Goode, Dr. S. Pearlman, Dr. Michael Schneider, Dr. Margaret Stewart, Dr. E. B. Sims, and the honorary medical staffs of "Mareeba" Babies' Hospital and of the Queen Victoria Maternity Hospital.

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ADDENDUM.

Since the completion of this manuscript, we have had the opportunity, through the kindness of Dr. D. G. McKay, of observing two further cases of congenital defect associated with rubella in pregnancy. In the first the abnormality was diagnosed as congenital obliteration of the bile ducts; the mother had suffered from rubella when three and a quarter months' pregnant. In the second case the child suffered from congenital heart disease and deaf-mutism similar to that described earlier; the mother had contracted rubella when two and a half months' pregnant. It is possible, in the case associated with congenital obliteration of bile ducts, that the occurrence of the defect subsequent to rubella in pregnancy was purely fortuitous.

A FEW POINTS ABOUT THE LAGRANGE OPERATION FOR GLAUCOMA.

By E. TEMPLE SMITH,
Sydney.

FURTHER experience has only confirmed my good opinion of the LAGRANGE operation for glaucoma as compared with trephining, and the increasing interest in it shown by my colleagues prompts me to add a few hints to my previous remarks.⁽¹⁾

The position of seizure of the globe for fixation remains important, and I still regard the insertion of a scleral stitch as almost an essential. The toughness of the sclera has to be experienced to be believed, and tearing at the fixation site is very likely, with its accompanying embarrassment. The stitch is not easy to put in, but with a very small and sharp needle it is well worth the trouble.

The head needs to be more than somewhat dependent, but this rather uncomfortable position need not be adopted until the scleral stitch and all preliminaries have been completed. This is to obviate hyphæma, which, if it occurs early in the procedure, will make a careful and planned iridectomy almost impossible. I make the iridectomy a "button-hole" one, unless the patient is very old, or if lens sclerosis or cataract is present (when a complete iridectomy is advisable). The repositor should always be used, to make sure that no impaction of the iris occurs at the angles of the wound. If this should occur, it will possibly nullify the effects of the operation, and tension may rise when the incision heals. I have seen this happen in just these circumstances, and I advised that the knife should be inserted in the original track and the iris and all the tissues severed up to the conjunctival covering. This freed the angle, and the tension became normal.

As a rule, the anterior chamber reforms almost at once. I had a case recently in which it did not do so for five days, and this gave me some anxiety. The complication was caused by my putting a stitch in the conjunctival flap with slight tension which prevented its settling down over the whole length of the incision. A stitch is usually unnecessary, and is better omitted; but if for any reason a stitch seems called for care must be taken that no undue pull on it is made.

The incision should not be more than five or six millimetres wide. A common fault of the neophyte is to make the counter-puncture too far away, causing too big an incision, with considerably more hæmorrhage. When the puncture has been made, the knife should be rotated so that its point in the anterior chamber is out of sight under the overhanging limbus. A tentative push will reveal a prominence in the sclera where it is about to emerge. If this prominence is deemed to be incorrectly placed—that is, too far out—the knife can be withdrawn a little and another slight thrust made. If this is in the right place, it is pushed on until its point emerges. Then a pause is made, when, if all goes well, some aqueous may balloon the conjunctiva; the pause is also to enable one to decide whether to cut straight out at right angles to a tangent to the surface of the globe, or to bevel the incision somewhat towards the operator. The knife is now turned flat and the conjunctival flap is fashioned. If any difficulty is found in completing the flap, owing to a sunken eye with a deep orbit or the inability of the patient to look down on account of the retrobulbar injection (which always precedes the operation), the knife may be withdrawn and the flap made with scissors.

With regard to the sclerectomy, after many trials I think that the incision should err on the side of being too far from the limbus rather than too near. In the latter case, the clearing of areolar tissue from the scleral lip presents difficulty, and, having so small a margin of sclera to work on, one is tempted to remove a slip of sclera of the length of the incision. This will mean a greater resultant astigmatism, temporary or permanent. One is also more likely to get a bleb like that met with in trephining; on the other hand, when the incision is further

from the limbus, one is more sure of having severed the cribriform ligament (an essential feature of the operation), a V-shaped sclerectomy incision is easy to obtain, scissors being used, and resultant astigmatism is unlikely. About 1.5 millimetres will be about the right distance from the limbus. After the first twelve hours very gentle massage should be instituted and continued once a day for a month. Atropine is used for a day or two, but there seems to be no tendency to iritis. The patient should be given two pillows from the start, and if any hyphæma is present, he should be well propped up.

For more detailed information I again refer those interested to the article by Henri LAGRANGE in *The British Journal of Ophthalmology* of September, 1937.

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AN OUTBREAK OF FOOD POISONING DUE TO STAPHYLOCOCCI.

By W. J. SCOTT AND D. F. STEWART,
Sydney.

(From the Council for Scientific and Industrial Research, Division of Food Preservation.)

THE illness arising from the consumption of foodstuffs in which staphylococci have grown and elaborated enterotoxin has been widely recognized and reported, particularly in North America, where it has been the subject of numerous detailed investigations (DAVISON and DACK, 1939 and 1942; JORDAN and BURROWS, 1934; MINETT, 1938). A wide variety of bakery, dairy and meat products have been involved, and a common feature of the outbreaks has been the storage of the incriminated foodstuff at temperatures greater than about 65° F.

The purpose of this note is to describe an outbreak in this country.

The intoxication followed the ingestion of boiled hams, which had been cooked approximately forty hours prior to consumption. Between cooking and consumption the hams were stored without refrigeration, the mean daily temperatures at the time being rather greater than 80° F. These hams were the only article of diet common to 58 men, who developed, after four to six hours, symptoms of shock and vomiting accompanied by abdominal pains. There were no deaths, and recovery was rapid and complete.

Immediately after the outbreak the hams were frozen, and they were thawed subsequently for bacteriological examination approximately three weeks later.

Of 22 samples removed with strict aseptic precautions from the deep tissues, heavy growths of staphylococci were obtained in ten, these organisms being virtually the only type present. The remaining 12 samples yielded only a few organisms of miscellaneous types. These findings, together with the characteristic symptoms reported, were a strong indication that staphylococcal enterotoxin was the cause of the outbreak.

Extracts of the hams were made by grinding up portions in distilled water, and after filtration and boiling they were tested by intraperitoneal injection of kittens (DOLMAN and WILSON, 1938). The results were negative, and as this procedure would inevitably dilute any toxin in the hams, strains of the staphylococci isolated were tested for their ability to produce enterotoxin in artificial culture. Accordingly eight strains (six of *Staphylococcus aureus* and one each of *Staphylococcus albus* and *Staphylococcus citreus*) were incubated for 40 hours at 37° C. on a brain-heart infusion medium with 0.3% agar added, in an atmosphere containing 25% of carbon dioxide. The resultant growths were harvested, and after filtration through muslin, they were boiled for twenty minutes to destroy any relatively labile toxins present. These heated

filtrates were injected intraperitoneally into kittens aged four to six weeks in a dose rate of 5.0 millilitres per kilogram of body weight. Three kittens vomited violently within a hour; but when subsequently they were retested with the same filtrates, autoclaved for thirty minutes at 250° F., they failed to react. In each instance a strain of *Staphylococcus aureus* was concerned. There is evidence, therefore, that at least three of the strains of staphylococci isolated from the hams were capable of elaborating an enterotoxin.

The history and symptoms described, together with the bacteriological findings, indicate that the outbreak was due to the consumption of hams in which certain strains of staphylococci had grown and produced enterotoxin.

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Reviews.

THE BEVERIDGE REPORT ON SOCIAL INSURANCE AND ALLIED SERVICES.

SIR WILLIAM BEVERIDGE's plan for social security is based on a diagnosis of want and is, as it must be, long and detailed.¹ The statement is made early in the report that although the existing system of social security in the United Kingdom compares more than favourably with similar systems in other countries, there is much room for improvement and serious deficiencies call for remedy.

After reporting a survey on the existing national schemes of social insurance and allied services, the author proceeds to make his recommendations, and in doing so is guided by three principles. The first is that full use should be made of experience gathered in the past, but that any proposals for the future should not be restricted by consideration of sectional interests established in the obtaining of that experience. The second, that a fully developed social insurance may provide income security, and freedom from want to a great extent, but still leave disease, ignorance, squalor and idleness. The third is that the State and the individual must cooperate to obtain social security, the State offering security as a right in return for service and contribution, in such a way as not to stifle incentive, opportunity and responsibility.

During the years immediately preceding the present war impartial scientific authorities arrived at the conclusion that in a number of cities in Britain three-fourths to five-sixths of all the want shown by surveys was due to interruption or loss of earning power. The report then goes on to say that such a conclusion does not affect the main conclusions to be drawn from the surveys, and a double redistribution of income through social insurance and by family needs is advocated as the way to the abolition of want. No indication is given as to how much of the interruption or loss of earning power was due to unemployment.

The author of the report places on the shoulders of the Government the responsibility of ensuring that unemployment and disease are reduced to a minimum, which is a major obligation and cannot be avoided by payment of the dole.

The plan for social security is all-embracing in scope of persons and of needs, and makes provision for compre-

¹"Social Insurance and Allied Services", Report by Sir William Beveridge, 1942. London: His Majesty's Stationery Office; Melbourne: Robertson and Mullens Limited. 9½" x 6", pp. 299, with 45 tables. Price: 3s. 7d. (A.).

"Social Insurance and Allied Services: Memoranda from Organisations", Appendix G to Report by Sir William Beveridge, 1942. London: His Majesty's Stationery Office; Melbourne: Robertson and Mullens Limited. 9½" x 6", pp. 248. Price: 3s. 7d. (A.).

hensive medical treatment and rehabilitation, and for funeral expenses. Contributions would differ according to the benefits provided and all would be insured for security appropriate to their circumstances without means test, the aim being to guarantee the minimum income needed for subsistence. Contributions would be paid by employers and employees and a certain amount secured by taxation based on capacity to pay.

Unquestionable and great are the advantages of unified social security, and they can be obtained only at the cost of changes in the present administrative machinery that will result in coordination, simplicity and economy. The principal changes from the present practice and the reasons for the changes are set out in detail and full advantage is taken of experience and achievements of the past, which are not overlooked or forgotten.

It is submitted that no satisfactory scheme of social security can be devised except on the following assumptions: (a) children's allowances up to the age of fifteen, or if in full-time education, up to the age of sixteen; (b) comprehensive health and rehabilitation services for prevention and cure of disease and restoration of capacity for work, available to all members of the community; (c) maintenance of employment, that is to say, avoidance of mass unemployment.

The report lists the eight primary causes of need as unemployment, disability, loss of livelihood, retirement, marriage, funeral expenses, childhood and physical disease or incapacity.

No one can disagree with the aims and objects of the report. However, maintenance of employment resulting in the health and happiness of the community is the first goal for which man must work and plan. Without it no scheme of social security can succeed; with it success is inevitable. But before any measure of permanency can be assured for such a plan nations must cooperate and freedom from want be extended so far as is humanly possible to all men of goodwill. In the modern world no individual can hope to have and retain security and freedom from want until nations are so placed.

MODERN PSYCHOPATHOLOGY.

DR. J. ERNEST NICOLE's book on psychopathology has just been reissued in its third edition, with several new chapters and new material added to former chapters.¹ The author has resisted the temptation to expand the book in order to achieve completeness, but has added sufficient new material to bring the work into line with the later developments of psychopathology. He, therefore, includes a chapter on cerebral localization and anatomy; discusses the psychological implications of the newer forms of shock therapy and prefrontal leucotomy; mentions the growing interest and significance of the Rorschach test and the interest at present attaching to the subject of war neurosis. A new chapter on applied psychopathology covers the social theories of Kolnai, Money Kyrle, Freud and others in respect to the social control of sex expression, the family, homosexuality, drug addiction and suicide.

This book has, since its original publication in 1930, become a minor psychiatric classic. It was written in the first place because its author, when a student of mental disorders, felt the need of such a work. It was meant to serve as a bridge between text-books on academic psychology and those dealing exclusively with psychiatry; and, in fact, it does serve as a very valuable bridge in this connexion. It is clearly written, up to date in subject matter and free from personal bias toward any particular "school" of thought. It thus gives the student and the medical practitioner (including the psychiatrist) a first-hand and useful account of the modern approaches to psychopathology. It supplies a rich and varied theoretical background for the clinical psychiatrist; and its perusal is bound to stimulate the interest of those engaged in sociological studies.

Unlike many other books on the same subject, Dr. Nicole's book is easy to read. He has adopted a simple style and the profundity of his specialized knowledge and the catholicity of his interests have given him the power to clarify in a domain notorious for its complexity. His book is, therefore, a valuable adjunct to any standard psychiatric text-book which it is likely both to complement and to clarify.

¹"Psychopathology: A Survey of Modern Approaches", by J. Ernest Nicole, L.M.S.S.A., D.P.M.R.C.P. and S.; Third Edition, Revised and Enlarged: 1942. London: Baillière, Tindall and Cox. 8½" x 5½", pp. 276. Price: 15s.

The Medical Journal of Australia

SATURDAY, SEPTEMBER 11, 1943.

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THE CONTROL OF DRUGS AND WARTIME PRESCRIBING.

In the days before the war most of the drugs used in Australia in the treatment of illness came from overseas, chiefly from Britain and the United States of America. In September, 1939, the outbreak of war gave immediate concern to those who imported drugs and also to those who manufactured drugs from crude products obtained overseas. Australian business houses did not carry particularly large stocks of drugs—there was no reason why they should when import facilities were so good. The fighting of a war meant that the blockading of Australia was a possibility, and in any case shipments of drugs with many other commodities would most likely be lost at sea by enemy action. Japan's Machiavellian irruption into the arena made conditions much more hazardous, but by the time this had happened the Commonwealth Government had taken steps to ensure an adequate supply of medical equipment for the fighting services and the civilian population. In December, 1939, the Minister for Defence, the Right Honourable R. G. Menzies, created the Medical Equipment Control Committee and gave it statutory powers under the National Security (Medical Coordination and Equipment) Regulations. The committee *inter alia* has authority to:

- (a) make orders for regulating, restricting or prohibiting the manufacture, production, storage, distribution, sale, purchase and use of medical equipment; and
- (b) on behalf of the Commonwealth, purchase, store and sell or otherwise dispose of, medical equipment.

The Chairman of the Committee has power to require any person carrying on a trade or business in relation to the manufacture, production, storage, distribution, sale, purchase or use of medical equipment, or any person employed in connexion with any such trade or business to

- (a) answer any question put to him;
- (b) furnish information, estimates or returns;
- (c) produce, and permit an authorized person to make copies of or abstracts from, any books, accounts or other documents relating to that trade or business.

The Chairman also has power, in order to secure compliance with any order made under the Regulations, to authorize a person to enter and search premises. Drugs are, of course, included in medical equipment, and it is around them that the activities of the Committee have largely centred. From time to time announcements have been made in this journal at the request of the Chairman regarding supplies of drugs, methods of usage and so on, and medical practitioners have been urged to economy and simplicity in prescribing. Appeals of this kind have met with a ready response from the majority of medical practitioners. In fact every one concerned—wholesale drug houses, pharmacists and members of the medical profession—has risen to the occasion. But the war is not over and is not likely to end in the immediate future. Unremitting vigilance and energy are called for in every aspect of our war effort. To become careless is fatally easy and is the one event against which we should all be on our guard in whatever part of the national effort we happen to be engaged. In these circumstances it will be profitable to review the work of the Medical Equipment Control Committee. Such a review will not only be a corrective against carelessness in the matter of drugs, but, since nothing succeeds like success, it will be calculated to increase the effort of individual practitioners.

To review the work of the Medical Equipment Control Committee is made possible by reason of an address given by the Chairman, Sir Alan Newton, to the Pharmaceutical Society of Victoria as recently as June 16, 1943, and published in *The Australasian Journal of Pharmacy* of June 30, 1943. The first fact to be noted is that it has been the policy of the Committee to rely on the voluntary cooperation of all those concerned in the manufacture and distribution of medical equipment; "with a few insignificant exceptions this cooperation has been vouchsafed in full measure by all those connected in any way with this work". The first thing to be done was to increase imported stocks as an insurance against future difficulties. The Government led the way by purchasing a reserve supply of essential items of medical equipment. This reserve is controlled by the Committee and is jealously guarded. It will be used only when all other stocks are exhausted. The next step was taken when a meeting of representatives of wholesale drug houses was convened and they were invited to combine together to obtain large stocks of imported drugs through private channels, but with government sponsorship. The response was gratifying and an executive officer was appointed by the drug houses to supervise the details of importation. But importation was not a simple matter; delays were unavoidable, and orders which normally would have been fulfilled from Great Britain in a few weeks were not complete until six months had elapsed. Because of these delays part of the order was duplicated in the United States of America. In due course all the drugs ordered at that time arrived in Australia. In this way a considerable reserve of crude drugs was accumulated in the Commonwealth, "a most fortunate event", since we have been able to carry on up to the present time without experiencing "any disastrous shortages". In the latter part of 1941 important changes took place. In August of that year word was received from Great Britain that medical supplies not locally produced were to be obtained in future through the Lend Lease administration. This was,

and still indeed is, a somewhat complicated business, and, as Sir Alan Newton points out, it would have been unreasonable to expect smooth and efficient working from the outset. For example, requisitions are lodged with the United States Lend Lease Administration through the British Supply Council. In certain cases bulk allotments are made to the Empire by the United States authorities, and these are apportioned among the various units of the Empire after consultation between British and Dominion Missions in Washington. Readers need not be burdened with details of the present arrangement and of the way in which it was brought about. It may be well to point out, however, that among the complicating problems are the questions of railroad space in America and of shipping space in the Pacific. The Committee acts in an advisory capacity to the Division of Import Procurement and it is reassuring to know that "supplies are now being landed in greater quantities and there is every reason to believe that this improvement will continue, thanks to the magnificent efforts being made by the United States of America in the production field". From this it must not be concluded that no drugs are received from Great Britain. Drugs have been received from the Old Country through private commercial channels; the present arrangement is that Australian sponsorship for importation of drugs is confined to the shipment of drugs approved by the British Ministry of Supply. Recently fifty drugs have been included among those approved for export to this country, "an action which will help to maintain the normal process of trade within the Empire".

No discussion on Australian drugs in wartime would be complete without reference to the developments that have taken place in the manufacture of drugs in this country. This has engaged the attention of the Medical Equipment Control Committee. In this regard it has not only suggested that new manufactures should be begun, but, in association with the Departments of Munitions and of Supply and Shipping, has been instrumental in providing men, materials, machines and money for the work. The wartime development of drug manufacture in Australia has been described at some length in *The Australasian Journal of Pharmacy* of November 30, 1942. Here it is pointed out that two distinct problems had to be overcome before local production of drugs could be commenced on a sufficiently large scale. First of all, processes and methods of production had to be worked out in the laboratory and in the field by highly skilled scientific workers, and secondly, the results of scientific work had to be applied to commercial production. In this matter the Medical Equipment Control Committee has had the cooperation of the Australian Association of Scientific Workers. It also has the assistance of a panel of scientific liaison officers under the chairmanship of Professor E. Ashby. *The Australasian Journal of Pharmacy* publishes a list of drugs which are already being produced in Australia or which will be in production in the near future. The full list cannot be reproduced in this place, but one or two of the more important items may be noted. Digitalis is now being produced, with some surplus for export. Sulphanilamide and sulphaguanidine are being manufactured, and the direct production of morphine from poppy hay is "a triumph for Australian research workers". Many other preparations are mentioned, and these include atropine,

salicylic acid, dextrose, ergot, caffeine, antacids, some carminatives, hyoscyne and chloral hydrate.

Two further facts concerning the work of the Medical Equipment Control Committee should be mentioned. The first is that some control is exercised over exports of drugs, the Committee making recommendations to the Department of Trade and Customs. The second is that by the collaboration of wholesale drug houses a system of voluntary rationing has been introduced to cover drugs in regard to which the stocks indicate the need for caution.

This short review of the "drug position" of Australia will, it is hoped, bring home to medical practitioners the fact that a great deal has been done to meet the needs of the Australian community in the matter of drugs, that cooperation has achieved the results described, and that continued cooperation is worth while. Every medical practitioner can help to make the drug position sounder and also to simplify the work of pharmacists, who, like medical practitioners, are doing their best to meet the situation created by the war, if he will use the Australian War Pharmacopœia. This publication, which was referred to in this journal in the issue of December 5, 1942, has been produced by the Pharmaceutical Advisory Subcommittee of the Medical Equipment and Control Committee, under the chairmanship of Dr. Byron Stanton, of Melbourne. In this pharmacopœia many so-called "frills" have been discarded. The community is learning to do without many of the "frills" of peace time and doctors can help the public to do without pharmaceutical "frills". If every care is taken and every avenue of economy is explored, it is probable that all essential drugs will remain in good supply.

Current Comment.

SPRAINED ANKLE AND ITS TREATMENT.

THE term "sprained ankle" is sometimes loosely used; in a true sprain some actual tearing of the ligaments of the ankle joint takes place. A sprain may vary in severity. Only a few fibres may be torn, or the whole of one ligament may be ruptured and in the most severe cases some avulsion of the bony attachments may take place—a fracture of bone may be added to the ligamentary injury. During the last decade a change in the treatment usually adopted for sprained ankle has occurred. E. W. Hey Groves, summarizing several articles on the subject in "The Medical Annual" of 1928, described the treatment of a minor sprain. The injured joint was to be bandaged with a roller bandage over cotton wool as tightly as the patient could bear it; or else narrow strips of adhesive plaster could be applied. After twenty-four hours the bandage was to be removed and light stroking massage was to be applied while the patient made such gentle active movements as he could undertake without causing pain. The bandage was then to be reapplied. After this treatment had been continued for three or four days, the patient was to be allowed to begin movements with some weight-bearing. When a "severe" sprain had occurred plaster was to be applied in such a way that it could be removed for daily massage, and after three or four weeks the plaster was removed and other treatment was to be adopted. An advance occurred when injections of procaine solution were given at the site of the injury. E. L. Frankel in 1939 reported twenty cases in which this form of treatment had been used.¹ He used from three to ten cubic centimetres of a 2% solution of procaine, the amount used

¹ *The Lancet*, September 9, 1939.

varying with the severity of the injury, and gave the injection at the most tender point. He described the effect of the treatment as dramatic. The signs and symptoms of the injury disappeared at once and the patient was able to walk home. After injection Frankel strapped the joint firmly with "Elastoplast" and advised the patient to use the limb carefully. Exercise was avoided for a day or two. In discussing this treatment Frankel pointed out that the injury was always accompanied by intense pain which might be localized to the site of the lesion or spread to involve the neighbouring parts. He then quoted the views of Leriche that an anatomically slight injury to the very sensitive nerve endings in the neighbourhood of a joint started a reflex, which began with centripetal impulses from joint to central nervous system. A vasomotor response followed, with local oedema and rise of temperature, pain and limitation of movement. The disturbance of the local vasomotor equilibrium gave rise to continued impulses and a vicious circle was established. The action of the local anaesthetic was to cut off and abolish the centripetal impulses. Another report on treatment of this kind was published in 1940 by H. H. Alexander, junior, who had used it in over five hundred cases.¹ Alexander stated that he gave an injection of not less than ten and not more than twenty cubic centimetres of a 2% solution of procaine hydrochloride. He immediately strapped the foot and ankle and carried the strapping up to the middle of the leg. (The method is well illustrated in his article.) As soon as the strapping had been applied the patient was made to put on his sock and shoe and to begin weight-bearing. It was found that after about an hour the effect of the procaine solution wore off and there might be some return of discomfort, but that if walking was persisted in this would gradually disappear in one or two hours.

The latest author to deal with this subject is P. E. McMaster, who writes from the Orthopaedic Department of the United States Marine Corps.² His paper is based on observations made in more than five hundred cases. More than two hundred of the patients were treated with injections of procaine hydrochloride solution. The amounts used varied between ten and twenty cubic centimetres and a 2% solution was used. An elastic bandage was applied to the ankle and the patient was returned to duty at once. In the treatment of over two hundred patients strapping with adhesive tape was used. Some of these patients were sent immediately to duty and the others were instructed to limit weight-bearing and to protect the ankle either by complete bed rest or by the use of crutches or cane. Rest in bed without weight-bearing for a day or more, with initial cold applications and later with hot applications to reduce swelling, was tried in 22 cases. Twenty-eight patients were given only an elastic bandage support, and eighteen with mild to moderately severe sprains were given no treatment, and both these groups were sent back to work immediately. It is thus apparent that McMaster had sufficient material from which to draw conclusions. His invariable finding was that patients, whether they suffered from moderate or severe sprain and "almost irrespective of the type of treatment given", who were immediately sent back to routine activity and use of the part, did much better than those who were put at rest for a few days with limited or no use of the part. Those who were made to be inactive for one or more days and were put to bed for hot or cold applications and those whose ankles were strapped and who were cautioned against weight-bearing and were given crutches, were often disabled for periods of a few days to two or three weeks. One patient was disabled for eight weeks. Those patients who were given no treatment or were given only an elastic bandage for support, but were immediately returned to duty and were made to move and use the part, "had remarkably little disability, which, if any, lasted not more than a few days". This was also true for most of the patients who were treated by strapping and were sent back at once to duty. "Swelling, pain

and stiffness rapidly disappeared, and disability of longer than two or three days was not common if the man continued his weight bearing and moved the ankle as instructed." However, injection of procaine hydrochloride solution gave consistently the best results. Disability was entirely absent in many cases and in others rarely lasted for more than twenty-four or forty-eight hours. Pain rarely recurred after injection and in no case was reinjection necessary.

McMaster insists that success of the injection depends on two factors. The first is the total elimination of pain and tenderness by "complete adequate initial intraligamentous injection"; the second and more important factor is the continued use and motion of the foot and ankle. He also refers to the views of Leriche that the benefit of local injection was the result of the elimination of pain and the prevention of vasomotor change. This in his opinion is not the sole answer because it does not explain the excellent results obtained, for example, by the use of strapping followed by immediate and continued use and movement of the part. Whatever the full explanation may be there is no question about the supersession of the old forms of treatment. One final warning must be given. McMaster had an X-ray examination carried out almost as a routine measure. For his own protection, if for no other reason, the medical attendant should not neglect such a step in any but the obviously less severe types of injury.

EXPLOSIVE INJURY CAUSED BY SOLID CARBON DIOXIDE.

SOLID CARBON DIOXIDE, also known as carbon dioxide "snow" and "dry ice", is always a source of interest to children of all ages. That it may be a danger to the more enterprising of them is not always realized. W. Orr Goehring has reported a case which draws attention to this danger.³ A schoolboy, aged fourteen years, in the company of another boy, purchased a block of "dry ice" at a local store. He placed it in a five-gallon garden spray can "in order to extinguish small fires with the vapor by suffocation". To increase the rate of vaporization the can was partly filled with water. While the boys were in the process of building another fire the can exploded; its upper edge struck the patient in the face, knocking him down and travelling a distance of fifty feet. A large lacerated wound of the face was caused, both maxillary antra were laid open and other bony injury resulted. The patient eventually recovered and the cosmetic result was satisfactory. Goehring refers to a paper by M. L. Som and A. H. Neffson who in 1937 drew attention to the danger of aspirating carbon dioxide snow.⁴ It appears that some children take a piece of "dry ice" and put it into the mouth in order to blow off "steam". Som and Neffson reported the history of a child who aspired a piece of "dry ice". The child choked, became blue and fainted. Eventually oedema of the larynx made tracheotomy necessary. For some days a thick membranous exudate was removed by suction and ten days elapsed before the oedema and exudate disappeared.

INDEX TO "THE MEDICAL JOURNAL OF AUSTRALIA".

OWING to the restrictions on the use of paper the half-yearly index to THE MEDICAL JOURNAL OF AUSTRALIA which in normal times would have been published in the issue of June 26, 1943, is being issued separately and will be sent to those who wish to have a copy. It will not be necessary for those who received a copy of last half-year's index to ask for another on this occasion. Others should make application to the manager at The Printing House, Seamer Street Glebe, New South Wales.

¹ The American Journal of Surgery, Volume L, 1940, page 581.

² The Journal of the American Medical Association, July 3, 1943.

³ The Journal of the American Medical Association, June 26, 1943.

⁴ Ibidem, Volume CVIII, 1937, page 970.

Abstracts from Medical Literature.

DERMATOLOGY.

Treatment of Psoriasis with Lipotropic Substances Derived from Foodstuffs.

P. GROSS AND B. KESTEN (*Archives of Dermatology and Syphilology*, February, 1943) discuss psoriasis as a disturbance of lipid metabolism. Madden's excellent histological study of the uninvolved skin of patients with acute guttate and generalized papular psoriasis has strengthened greatly the concept of this disease as a disturbance of fat metabolism. The histological changes which Madden found in the uninvolved skin but at the sites of election for psoriasis were: an increase of extracellular fat around the pilosebaceous apparatus and sweat glands and throughout the corium, and a constant leucocytic infiltrate in the papillary bodies and in the upper half of the cutis. When the infiltrate was great the capillaries were dilated and engorged and the papillary bodies elongated and pushed toward the surface. The temptation is to conclude that the difference between the apparently uninvolved and clinically psoriatic skin is only a matter of lowered threshold. It may be dependent either on local conditions in the skin or on the scarcity of the metabolic process. The tendency of psoriasis to occur on the elbows and knees may be due to factors peculiar to these areas, such as mechanical injury, stretching of the skin or lowered oxygen supply. This phenomenon exhibited in psoriasis may be likened to the cutaneous changes in pellagra and is particularly pertinent since pellagra represents a metabolic disturbance brought about by a vitamin deficiency. Grütz and Birger concluded that psoriasis was a lipoidosis because of the increased lipids in the serum and cutaneous lesions of the patients with psoriasis and the favourable response to a low fat diet. It should be remembered that the term fat metabolism as applied to neutral fats, unsaturated fatty acids, phospholipids and sterols may include interdependent but quite possibly independent processes. An alteration of the processes does not necessarily have to express itself by an increase in serum cholesterol or total lipids, for as extensive a lipid disturbance as xanthomatosis may be associated with a normal cholesterol content of the serum. Since modern biological chemistry has firmly established that vitamins which supply the building stores for cellular enzymes are essential to the metabolism of fats, it seemed worth while to evaluate the therapeutic action of various vitamins on psoriasis from this point of view. The authors studied the therapeutic effect of crude natural vitamin B complex in the form of liver extract, yeast, rice polishings extract and wheat germ, and another natural substance derived from soy beans rich in cephalin and lecithin. This "soy bean lecithin" was effective in reducing experimental cholesterolemia in rabbits. The soy bean lecithin mixture resembles lipoic acid in its action, not only in its therapeutic effect in psoriasis, but in its pronounced

ability to reduce abnormally high serum cholesterol in patients with lipid disturbances. The authors have about forty patients with chronic psoriasis under treatment with either the wheat germ or the soy bean lecithin and with or without the addition of local therapy. In most instances within a few weeks of administration of the lipotropic substances new psoriatic patches have ceased to appear and gradual involution of the plaques has begun.

Herpes Gestationis.

G. M. LEWIS (*Archives of Dermatology and Syphilology*, December, 1942) presents a case of *herpes gestationis* in which treatment by sulphathiazole was successful. In the author's experience temporarily successful results in the treatment of *herpes gestationis* may be obtained from the oral administration of one of the several sulphanilamide compounds. Sulphanilamide, sulphapyridine, sulphathiazole and sulphadiazine have all proved efficacious in bringing about an amelioration of the severe pruritus associated with the disease. There is usually a prompt relapse unless the dose of the drug is maintained. Sulphathiazole, which is in favour because of its low toxicity, is usually effective in a maintenance dose of from one to two grammes daily. Prolonged administration being hazardous, periodic examinations of blood and urine should be made. The author states that the usual treatments have been unsatisfactory and sometimes only bring temporary relief. The effectiveness of the various sulphanilamide compounds in the treatment of *dermatitis herpetiformis* prompted the experimental use of sulphathiazole in the author's case of *dermatitis gestationis*, the latter being considered by many writers to be a variant of or identical with *dermatitis herpetiformis*. A patient with *herpes gestationis* beginning at the fourth month was almost completely relieved of pruritus following therapy with sulphathiazole, given in doses of 0.5 gramme thrice daily for the first week. A favourable effect was almost immediately evident, with a lessening in itching, allowing the patient to sleep uninterruptedly. The dose was then reduced to 0.5 gramme twice daily, and since the patient remained comfortable and asymptomatic, this dose was maintained until delivery, a month after treatment was instituted.

Acetarsone in the Treatment of Pemphigus.

M. OPPENHEIM AND D. COHEN (*Archives of Dermatology and Syphilology*, January, 1943) quote various authors, who published favourable results from the administration of acetarsone in several cases of eruptions of the pemphigus group. Oppenheim himself in a paper discussing the entire subject described four patients with pemphigus and one with *dermatitis herpetiformis*, who were treated with this drug with excellent results. Rothman is quoted as saying that "through the use of acetarsone the life expectancy of patients with pemphigus becomes twice as long, on the average". The authors presented at various meetings of the Chicago Dermatological Society three patients with pemphigus, including two with *pemphigus vulgaris*

and one with *pemphigus vegetans*. All were treated with acetarsone. These patients are symptomless after more than one year. The authors describe their method of treatment which briefly is as follows. The patient takes two grammes of acetarsone in three days, and then there is a three-day rest period. The dose is eight tablets given on three mornings: two tablets the first morning and three tablets each remaining two mornings. The tablets are dissolved in a small amount of water, and after taking this the patient drinks half a glassful of water. This dosage is maintained until the number of tablets taken equals the number of kilograms of body weight. The treatment is then continued with longer intermissions and with lessening of the dosage following clinical and subjective symptoms. Locally daily oatmeal baths and 5% boric acid ointment were used every day as a local application and a bland diet was prescribed. At the moment that the patient feels ill or if pruritus appears, administration of the drug is stopped.

Skin Disturbances in Diabetes Mellitus and their Relation to Vitamin Deficiencies.

A. RUDY AND R. HOFFMANN (*The New England Journal of Medicine*, December 10, 1942) state that skin disturbances in *diabetes mellitus* are very frequent. Commonest among them is pruritus, both general and local. Dermatitis is seen in the genital regions, in the intertriginous areas and in other parts of the body that are exposed to irritation of any kind. Fissures in the corners of the mouth and eyes and changes in the nails and hair are frequently observed. The skin of the diabetic patient seems to be predisposed to pyogenic and mycotic infections. About five years ago one of the authors (A. Rudy) began a study of the various manifestations of vitamin deficiencies and their frequency in diabetes. It was observed that the skin manifestations in *diabetes mellitus* are frequently of a pellagrous type and that, on careful observation, signs of deficiency of one or more components of the vitamin B complex either before, during or after the discovery of the skin disease can be revealed. At times there are also manifestations of a deficiency in other vitamins. The authors present cases to demonstrate that the skin disturbances in *diabetes mellitus* are most frequently due to deficiency, especially that of nicotinic acid. The authors conclude that skin disturbances are not related to the glycosuria or hyperglycaemia, but are due to increased vulnerability of the skin as a result of a deficiency in the components of the vitamin B complex, especially nicotinic acid. Pellagrous dermatitis in diabetes is especially frequent and is often diagnosed as *psoriasis vulgaris*. *Pruritus vulvae* and *pruritus ani* in diabetes are a manifestation of pellagra and respond to treatment and nicotinic acid. A careful history and physical examination in these cases will invariably disclose manifestations or signs of multiple vitamin deficiencies—a beefy or smooth tongue, cheilitis and gastro-intestinal, genito-urinary, neurological, mental and other disturbances. These signs may precede or follow the skin disturbances. The skin lesions may improve, remain unchanged or even

become aggravated with the control of the diabetes by diet, with or without insulin. They always respond to treatment with nicotinic acid. The monilial infections clear up without local treatment. A complete cure from nicotinic acid may take from a few days to several months. The more stubborn cases require fairly large doses parenterally as well as orally. Since the vitamin deficiency is frequently multiple, the entire vitamin B complex should be administered in addition to the nicotinic acid.

Colloid Degeneration (Collagen Degeneration) of the Skin.

M. J. REUTER AND S. W. BECKER (*Archives of Dermatology and Syphilology*, November, 1942) point out that colloid degeneration of the skin, also known as colloid milium, is a rare dermatosis of unknown origin. It is characterized by discrete or confluent yellowish nodules occurring predominantly on the exposed surfaces and from which, on puncture, a gelatinous, translucent yellowish or brownish material can be expressed. On microscopic examination hyalin-like degeneration of the collagen bundles of the dermis is found. Exposure to sunlight, heat and the elements has been emphasized as a possible factor, since the disease occurs predominantly on the exposed surfaces and because most of the cases have been reported from warm and temperate climates.

UROLOGY.

Transurethral Prostatectomy.

W. A. MILNER (*New York State Journal of Medicine*, March 15, 1943) discusses perurethral prostatic resection under the title prostatectomy. The author states that during resection three types of tissue are encountered: (i) the fibrous structure of the vesical neck, (ii) the granular adenomatous tissue and (iii) the surgical capsule around the adenoma, showing a typical striation. The author believes that the stimulus which led to the devising of endoscopic resection was a desire to relieve the mortality, morbidity and economic distress associated with the previous open operation methods of treatment of prostatic obstruction. One of the greatest benefits conferred by endoscopic prostatic resection is the removal of fear about prostatic surgery; this is the mental attitude of the average patient today. The author reports a mortality of only 2.74% in a group of 1,093 patients treated in the past ten years, and states that no patient in the last consecutive 977 cases has required any other type of surgery to relieve his obstruction. Carcinoma was found in 14.8% of all cases. Good results depend on the ability of the operator to recognize the various types of tissue encountered during resection, and to remove neoplastic tissue right down to the surgical capsule. Post-operative discomfort and infection are due to leaving behind tags or masses of necrotic tissue; a clean resection gives immediate good results. The average stay in hospital over the whole series, including pre-operative treatment, was about fourteen days. The end-results in non-malignant cases, as judged by 465 replies to a questionnaire

sent to 550 patients selected at random, were very satisfactory. Of 293 patients remaining alive after a varying number of years up to ten, 273 gave the results as excellent, 10 as fair and 11 as poor.

Advanced Prostatic Cancer.

C. HUGGINS (*New York State Journal of Medicine*, March 15, 1943) states that the inactivation of androgens by oestrogenic therapy in cases of prostatic carcinoma is at first sight attractive, since it can be carried out without any operation. However, it is unsound, for the inhibition of androgen formation is not complete, and a complete inhibition or elimination of androgens is the necessary basis of the modern treatment of advanced prostatic carcinoma. Moreover, the oestrogen must be administered more or less permanently. Therefore, bilateral subcapsular orchidectomy is the method of choice for advanced or metastatic prostatic carcinoma. For early carcinoma, many workers still advocate radical, that is, complete, prostatic-vesiculectomy by the perineal route. Forty-five men have been treated by castration for advanced prostatic carcinoma since October, 1939. Within a few days of the operation, pain is relieved and the appetite regained. Weight is then increased and anaemia relieved. Very frequently there is a marked change in the primary growth, so that, from being hard, nodular and craggy, it becomes smooth, soft and smaller. Skiagraphic changes appear within several months of orchidectomy in bony metastases, in the direction of increased calcification. This is often followed by cessation of growth, or even disappearance, of the bony metastases. Abolition of sexual capacity and hot flushes often appear; but the latter can be ameliorated by one milligramme of stilboestrol *per diem* by mouth. In the entire series of 45 patients subjected to orchidectomy, there were eight deaths, all who died being men with extensive metastases to bone; 31 patients have had a sustained improvement lasting up to thirty months; nine patients had a temporary improvement followed by recurrence of symptoms, while the condition of five others did not improve after the operation.

Sclerosing Solutions in Vesical Diverticula.

J. J. BOTTONE AND F. L. SENGER (*Urologic and Cutaneous Review*, February, 1943) describe a new technique for the surgical treatment of vesical diverticula. The advantage of the method is that a big operation, of high shock value, is obviated. This condition is nearly always met in men, and the first thing to do is to remove the invariable bladder-neck obstruction, either by perurethral resection or by prostatectomy. Should symptoms of vesical distress persist, then removal of the diverticulum is called for. It has been shown that complete removal of the mucosa of the diverticulum by dissection allows collapse and obliteration of the diverticular cavity, and this method has been used by a number of surgeons. However, it may be difficult to carry this out thoroughly, and, with the object of simplifying the procedure, the authors propose a sclerosing solution method. They have drawn on their own experiences in hydrocele to devise the new method, and report

complete cure in a case in which a foul infection with *Bacillus coli* and *Bacillus proteus* existed. The lateral wall of the opened bladder is incised right down to and through the neck of the diverticulum, the latter being separated from the bladder. The bladder wall is sutured completely, and finally closed on top around a large de Pezzer drain (36F). The diverticulum is then closed completely about a 28F de Pezzer drain. Beginning one week after operation, the diverticulum is irrigated several times each day with a 1 in 4,000 solution of neutral acriflavine, and later a 1 in 100 aqueous solution of mercurochrome. When the infection subsides, sclerosing solutions are introduced. Sodium chloride in 30% strength is used. One to two ounces of the salt solution are injected into the diverticulum, retained for two hours, and then drained off. This is done twice a week till there is practically no diverticular drainage, when the diverticular tube is removed. Soon afterwards, the vesical tube can be removed and the bladder wound allowed to heal.

Cutaneous Ureterostomy in Active Renal Tuberculosis.

F. C. COLBY (*The Journal of Urology*, October, 1942) draws certain conclusions from ten cases of renal tuberculosis in which the ureters were transplanted to the skin. Advanced renal disease was present in all. In many there was active bone tuberculosis, although there were no active pulmonary lesions. The mortality in this series was nil. Simultaneous ureterostomy was done upon two patients who had tuberculosis of both kidneys. Both died after a few months, and were not particularly benefited while alive. Considerable benefit, however, resulted after removal of the opposite tuberculous organ when the remaining kidney was diseased. The intolerable bladder symptoms were relieved, and the progress of renal damage slowed up. Five such patients with cutaneous ureterostomies are alive and useful. If the operative result is a rosette of ureteric mucosa projecting beyond the skin, there is reason to believe that these patients can live comfortably without catheters, and that they may escape stricture formation at the skin level, even in the presence of active renal tuberculosis. An apparatus collects the urine, and the inconvenience of changing catheters is avoided.

Pyuria in Infants and Children.

L. ROBBIN (*The Urologic and Cutaneous Review*, December, 1942) states that all acute urinary tract infections in infants and children respond quickly to sulphonamide therapy. At present, sulphadiazine is the drug of choice, but sulphathiazole is preferred if the *Streptococcus faecalis* is present. When sulphonamides are contraindicated for any reason, mandelic acid is used. When a chronic infection persists, full urological examination is required, and congenital abnormalities should be excluded. In the author's series, 200 cases of pyuria are analysed. Of these, 90% were of the acute type, 98% of the patients were girls, and 75% were between one and four years of age. The colon bacillus was most commonly found on culture.

Medical Societies.

THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING of the Medical Sciences Club of South Australia was held at the Institute of Medical and Veterinary Science, Adelaide, on June 4, 1943.

The Identification of Disease-Resistant Genes in Plants.

MR. A. T. PUGSLEY presented a paper on the identification of disease-resistant genes in plants. He pointed out that the success of the plant breeder's work in producing new disease-resistant varieties of crop plants was dependent upon a sound knowledge of the various disease-resistant genes at his disposal.

For the disease barley mildew (*Erysiphe graminis tritici*) six genes for resistance had so far been identified. Two of these had been located on chromosome II and one on chromosome IV. While any one of these would confer resistance, the allelomorphs of all six had to be present if a plant was to be susceptible.

It had been possible to combine in a single plant the stem rust resistant genes from the two resistant varieties Eureka and Warigo; so that the range of environment under which a variety would be resistant had been expanded.

The results were given of a study made to determine the relative effectiveness of four genes, M, R, H and T, against several races of the bunt pathogen *Tilletia tritici*. The T gene present in the variety Oro had been shown to be the best one for incorporation in Australian wheat varieties.

Correspondence.

HIGH AND LOW.

SIR: This is not a search, just a casual find. Psycho-analysing one of my patients in the old-fashioned way by inviting him to a fireside chat, he began to tell me of the people in his street. A neighbour on one side had lost his wife some months ago and he was very despondent and lonely. He decided to see his doctor to get cheered up with a tonic or something. The first dose of tonic was to tell him that his blood pressure was too low. With a heavy heart, still more bowed down with grief and woe, being a painter, he cleaned his paint brushes in turps and put them away *sine dye*, sat most of the day beside his wireless set and moped. Paying [sic] his weekly visits to the doctor, he learned that his blood pressure dropped lower and lower. My friend, seeing this haggard face and form over the dividing fence, wanted to know why he was not working and was finally successful in persuading this fading painter to paint his house. At the end of a fortnight the invalid was slapping on the paint like a non-unionist, and by his complexion any one could see, said my patient, that the blood pressure was on the upgrade and (as we say) convalescence was uneventful. The neighbour on the other side was a lady who came back from the doctor to tell her husband that she "had" high blood pressure and went to bed so that hubby left his bed two hours earlier every morning and got into it two hours later at night. In that street the war and the elections are forgotten and high and low blood pressure have the floor (unswept) while my patient is getting a lot of fun out of it. That was what I wanted to know, had he a sense of humour?

Yours, etc.,

A. C. F. HALFORD, M.D., F.R.A.C.S.

Brisbane,
August 17, 1943.

POST-MORTEM EXAMINATIONS: AN INVITATION.

SIR: With the approval of the Chairman and Board of Directors of the Royal Prince Alfred Hospital, an invitation is extended to general practitioners and medical superintendents of hospitals in which post-mortem examinations cannot be carried out, to avail themselves of the facilities for the performance of autopsies in the Lord Nuffield Theatre of Pathology in the New Medical School.

On each occasion it will be necessary for the medical practitioner in charge of the case to ensure: (i) that satisfactory arrangements are made for transport to and from the post-mortem theatre; (ii) that written permission to perform the autopsy is obtained and is in the hands of the pathologist before the post-mortem examination is commenced; (iii) that full clinical notes and the results of laboratory investigations are forwarded for perusal before the autopsy is performed; (iv) that, when skiagrams have been taken, films are available for display at the autopsy; (v) that, when biopsies have been performed, the sections of the biopsy specimens are available for examination at the autopsy.

Skiagrams and other exhibits will be returned to the medical officer in charge of the case together with a copy of the autopsy report.

It is important that bodies should be received as soon after death as possible, so that refrigeration may ensure satisfactory histological investigation.

The usual time for post-mortem examinations is in the morning.

When arranging for autopsies, ring LA 2841, extension 390.

Yours, etc.,

ALAN B. LILLEY, General
Superintendent.

Royal Prince Alfred Hospital,
August 18, 1943.

ADVICE URGENTLY REQUIRED.

SIR: Would readers please advise me on the following.

Fifteen years ago my wife had a cholecystectomy performed. Since then, on taking any opiates, very severe attacks of colicky abdominal pain occur. I take it that these are due to spasmodic contractions of the sphincter of Oddi.

As she is soon due for a gynaecological operation, I would be greatly obliged for the following information: (a) the best procedure to relieve post-operative pain in her case; (b) how to prevent the above effects of opiates; (c) an efficient cough sedative outside the opium group.

Yours, etc.,

August 22, 1943.

"PERPLEXED."

AVAILABLE SOURCES OF ANTI-RH SERUM.

SIR: The recently reported fatal blood transfusion reaction, apparently due to the Rh factor (Newton and Tebbutt, *THE MEDICAL JOURNAL OF AUSTRALIA*, August 7, 1943, page 109), directs attention to the possibility of obstetric hospitals maintaining constant stocks of anti-Rh serum, which could be made available to non-obstetric institutions or to practitioners faced with a problem similar to that described by the authors in their case report.

Since serum containing anti-Rh agglutinin in sufficient titre to be used in pre-transfusion tests is most likely to be obtained from puerperal patients who have given birth to an infant suffering from *hydrops foetalis* or *icterus gravis neonatorum*, obstetric hospitals are, by comparison, the most favourably situated in regard to the collection of such serum.

But, whilst the anti-Rh serum will, no doubt, be widely used in selecting suitable donors for puerperal patients or for babies suffering from *icterus gravis neonatorum*, our experience has shown that, having met all such requirements, there is, with proper cooperation, still serum available for other purposes.

Of twelve patients referred in recent months from the Brisbane Women's Hospital to the Pathology Department as being likely to have anti-Rh agglutinin in their serum, ten were found to possess the antibody. Although the titre of the agglutinin was sufficiently strong to use in pre-transfusion tests in only four of those ten cases, it has been possible constantly to maintain a bank of Group "O" Rh negative blood. Over thirty donors have been identified as Rh negative, and a number of these are willing to make further contributions to the blood bank.

Thus, even if the supply of anti-Rh serum became exhausted, Rh negative blood would still be available in an emergency.

The indications for these additional precautions in the choice of donor in obstetric practice have recently been stressed in these pages. The evidence available now suggests that it would be a wise precaution to test the Rh quality of the recipient's blood in any case where a first

transfusion had been accompanied by some reaction and a second transfusion was needed.

In the meantime, an opportunity has developed for the administrators of obstetric hospitals to take a lead in this matter.

Yours, etc.,

G. SHEDDEN ADAM.

The Brisbane Women's Hospital,
Bowen Bridge Road,
Brisbane, N.I.
August 24, 1943.

BACILLARY DYSENTERY.

SIR: The excellent review of bacillary dysentery issued as a supplement to the journal of August 21 includes this statement:

The desoxycholate-citrate medium introduced by Lefson and modified by others is much better than MacConkey's medium for the demonstration of dysentery organisms in faeces, and there is no justification for the continued use of MacConkey's agar, as far as work on dysentery bacilli is concerned.

This dogmatic assertion might give rise to the mistaken impression that a bacteriologist who continues to use MacConkey's medium is out of touch with modern practice. The reference is to Fairbrother,⁽¹⁾ who bases his opinion on the isolation of thirty strains of dysentery bacilli, in which several common types did not appear, and on the examination of laboratory cultures, the number and variety of which are not recorded.

Most pathologists of the Australian Army Medical Corps have had considerable experience with the isolation of dysentery bacilli, and few would agree that MacConkey's medium should be discarded. A Royal Army Medical Corps review of the recent literature dated 1943 concludes: "The use of MacConkey's medium should be continued. . . . A selective medium should also be used."

The new selective media are of undoubted value, particularly in carrier surveys. But their very selectivity entails some disadvantages. Neither Lefson's desoxycholate-citrate medium nor Wilson and Blair's rosolic acid medium is suitable for isolation of every type of dysentery bacillus, the former partially inhibiting *Bacillus dysenteriae* Shiga, the latter, *Bacillus dysenteriae* Boyd IV (page 274). Another defect of desoxycholate-citrate agar is that colonies of dysentery bacilli isolated on it may fail to show specific agglutination until they have been subcultured on plain agar. MacConkey's medium has a further practical advantage because batches of uniform quality are easily prepared from ingredients which are readily available.

Probably the best of the newer media is "S.S." (Shigella-Salmonella) medium, which is not referred to in the supplement.

Yours, etc.,

E. V. KROGH, Lieutenant-Colonel.

Allied Land Forces Headquarters,
Melbourne, S.C.I.
August 25, 1943.

Reference.

⁽¹⁾ R. W. Fairbrother: "Selective Media for Isolation of Bact. *Dysenteriae*", *Journal of the Royal Army Medical Corps*, Volume LXXX, March, 1943, page 151.

THE PARLIAMENTARY JOINT COMMITTEE'S REPORT.

SIR: The journal of July 17 last contains the Sixth Interim Report of the Parliamentary Joint Committee on Social Security.

Paragraph 115a of this report contains the committee's recommendations relative to the control of the venereal diseases.

One feels that all interested in this subject will agree that abuse of alcoholic liquors is a cardinal factor in the transmission of such diseases.

Failure of the committee considering such a problem to include in its conclusions recommendations dealing with alcoholic excesses indicates that the approach has not been truly scientific.

Yours, etc.,

C. R. DUNKLEY, Captain, A.A.M.C.

August 23, 1943.

COMMONWEALTH GOVERNMENT POLICY REGARDING VENEREAL DISEASE AND CONTRACEPTION.

SIR: I am writing this note because a very peculiar statement with regard to Commonwealth Government policy has appeared in the July 17 number of *The Journal of the American Medical Association* from their "Regular Correspondent" in Australia:

Recently, however, the commonwealth government under national security regulations made it illegal to display, advertise or promote the sale of any article as a medicine, instrument or appliance for the alleviation of venereal disease or the prevention of CONTRACEPTION.

It is to be hoped that misstatements of this sort are infrequent.

Yours, etc.,

R. DOUGLAS WRIGHT, Professor
of Physiology.

University of Melbourne,
Melbourne, N.S.
August 27, 1943.

Obituary.

RICHARD HERBERT JOSEPH FETHERSTON.

THE following tribute to the late Dr. Richard Herbert Joseph Fetherston has been received from Major-General Rupert M. Downes.

With the death of R. H. Fetherston one of the notable personalities of the military history of Australia has gone, a man of vast ability, personality and kindness. To say the least, no one has achieved more in organization of the medical services of Australia in wartime.

In his early military life Bertie Fetherston was one of the personalities of the volunteer and militia field artillery and many senior present and past notable soldiers had their first military experience in medical examinations at his hands. Son of the principal medical officer in Victoria—an equally striking personality—he first appeared on the military stage as medical officer to B Battery of the Victorian Field Artillery, where his popularity and influence in the week-end and camp life of the unit was very noticeable. The end of his military career was as head of the medical services of Australia, where his achievements were responsible for the saving of the life, limb and health of innumerable Australians. That he was able in this position with a woefully meagre staff and with no previous experience of wartime requirements to organize and continue to support the fine medical service that was charged with the proud task of caring for the sick and wounded of the Australian Imperial Force, marks him out as a man who had the capacity for and did great things. To one who had a comparable responsibility, but with the help of a splendid staff, his achievement almost singlehanded and guided by correct vision rather than experience always appeared a remarkable one. The main characteristics of his personality as a soldier that remain in one's mind are his decisiveness, hatred of humbug, fearlessness both moral and physical—the writer had amusing but not entirely pleasant experiences of the latter—and staunch faith in those whom he had decided to trust. On the other hand he was a hard but straightforward enemy and slow to forgive anyone who had "let him down". What he achieved in his two inspectional visits to the Australian troops overseas and the war areas has been described by others, so that it will suffice to say that much that is good in our medical services of today derives from his observations and clear-minded actions on those visits. It is well that his views were so sound, for rarely, if ever, has a medical administrator wielded such powers as were afforded to him on these missions.

It was indeed unfortunate that he was not provided with any post after the Great War in which his unrivalled military organizational experience and ripe judgement could have been utilized, but he was only too ready at all times to give any advice and information when it was sought; never did he, uninvited, press his views.

Though I have been asked by my *confrères* to speak of him from the military viewpoint, I cannot draw completely my own picture of him without stroking in the vignette of "Fetherie" as he was in the council room of the Victorian Branch of the British Medical Association. Sitting at the centre table, not always hearing exactly what was said, he

would at intervals intervene in discussions with clear-cut and trenchant contributions to whatever was the subject of debate, often demolishing some previous feeble contention, but never so that it would leave any hurt. No one trifled with him, but if any joke could be made against him he accepted it in the best of humour.

Life had held many disappointments and some injustices for him. Never did he show his hurts nor strain the interest of friends with their recital. He did not make friends easily, but once he did it was a lasting relationship. Equally, if he disapproved there was no doubt of it.

In sum, we must not mourn but remember that the results of what he did still live, and will continue, and that all who run may take example from a life of fearless, straightforward, clean and able effort. I, who owe more than most to him, rejoice to take the opportunity of paying some small tribute.

HAROLD RAMSAY BEATTY.

We regret to announce the death of Dr. Harold Ramsay Beatty, which occurred on September 5, 1943, at Strathfield, New South Wales.

Australian Medical Board Proceedings.

QUEENSLAND.

THE undermentioned has been registered, pursuant to the provisions of *The Medical Acts, 1939 to 1940*, of Queensland, as a duly qualified medical practitioner:

Collin, Robert, M.B., B.S., 1942 (Univ. Sydney), East Street, Ipswich.

Notice.

THE honorary secretary of the University of Sydney Medical Society wishes to inform 1943 graduates who were members of the society that the 1943 issue of *The University of Sydney Medical Journal* has been published and is available to them on application to Mr. W. Boyd, the New Medical School, University of Sydney.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

McInerney, John Cranstoun, M.B., B.S., 1940 (Univ. Sydney), Captain McInerney, J. C., 2/2 Australian Independent Company, Australia.

Repin, Stella, M.B., B.S., 1940 (Univ. Sydney), 24, Benelong Crescent, Bellevue Hill.

Hemmingway, Clifford Kenneth, M.B., B.S., 1942 (Univ. Sydney), 10, Bellevue Street, Kogarah.

Robertson, James Struan, M.B., B.S., 1939 (Univ. Sydney), 32, Karranga Avenue, Killara.

Leighton, Isabel Emily, M.B., B.S., 1942 (Univ. Sydney), 10, Bellevue Street, Kogarah.

Sanders, John Vyvyan, M.B., B.S., 1941 (Univ. Sydney), 8, Hastings Road, Turramurra.

Medical Appointments.

Dr. W. E. L. H. Crowther, pursuant to the provisions of the *Hospitals Act, 1918*, of Tasmania, has been appointed to the Board of the Hobart Public Hospitals District.

Dr. Nina Patty Banks has been appointed to be a medical officer of the Department of Public Health of New South Wales.

Naval, Military and Air Force.

CASUALTIES.

ACCORDING to the casualty list received on September 8, 1943, Captain D. C. Whitfield, A.A.M.C., Casterton, Victoria, has been reported missing.

Diary for the Month.

- SEPT. 14.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
 SEPT. 14.—Tasmanian Branch, B.M.A.: Branch.
 SEPT. 15.—Western Australian Branch, B.M.A.: Branch.
 SEPT. 21.—New South Wales Branch, B.M.A.: Ethics Committee.
 SEPT. 22.—Victorian Branch, B.M.A.: Council.
 SEPT. 23.—New South Wales Branch, B.M.A.: Clinical Meeting.
 SEPT. 24.—Queensland Branch, B.M.A.: Council.
 SEPT. 25.—New South Wales Branch, B.M.A.: Medical Politics Committee.
 SEPT. 30.—New South Wales Branch, B.M.A.: Branch.
 OCT. 1.—Queensland Branch, B.M.A.: Branch.
 OCT. 5.—New South Wales Branch, B.M.A.: Council Quarterly.
 OCT. 6.—Victorian Branch, B.M.A.: Branch.
 OCT. 6.—Western Australian Branch, B.M.A.: Council.
 OCT. 7.—South Australian Branch, B.M.A.: Council.
 OCT. 8.—Queensland Branch, B.M.A.: Council.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

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